ANNEX A

FISH AND WILDLIFE COORDINATION ACT REPORTS AND COORDINATION

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ANNEX A
COORDINATION WITH U.S. FISH AND WILDLIFE SERVICES
FISH AND WILDLIFE COORDINATION ACT

Coordination Date	Information coordinated	Coordination determination
March 8, 2004 USFWS Supplement to FCAR	Review of 30% document that eliminates construction in the toe ditch and confines project to the existing HHD footprint	Reduces impacts previously addressed in the Dec. 20, 2001 FCAR & March 4, 2003 Supplemental FCAR. No significant impacts expected except temporary dewatering of toe ditch.
February 23, 2004 USACE letter	New 30% design, additional reduction in impacts, and information on recommended alternative	Wetland impacts have been eliminated with the exception of temporary impacts associated with construction
October 28, 2003 USFWS letter	Letter documenting review of VE report that modified recommended plan in Sub-reach 1A to reduce impacts	Request 30% Designs to review prior to submitting a supplement to FCAR
June 27, 2003 USACE letter	VE report recommendations on Sub-reach 1A only, not entire Reach	Sub-reach 1A design changes from the original MRER recommendation, eliminating impacts in this sub-reach that has higher quality wetlands
March 4, 2003 USFWS Supplemental CAR	Review of VE report and modifications to recommended plan design	Reduces impacts on wetlands; No mitigation required. Reminder of commitments to complete bald eagle and eastern indigo snake measures
January 14, 2003 USACE letter	Results of the VE study.	Request for review
December 20, 2001 USFWS Final CAR	Review of draft EIS and impacts associated with alternatives	While filling and excavation of wetlands on landward side of HHD are of lesser concern, impacts to habitat are significant enough to require mitigation; Concerned with any construction that would be proposed on waterward side of HHD and effects to Lake; Concerned with construction impacts to burrowing owls, bald eagles, and eastern indigo snake. Measures should be implemented.

ANNEX A
COORDINATION WITH U.S. FISH AND WILDLIFE SERVICES
FISH AND WILDLIFE COORDINATION ACT

March 21, 2001 USFWS letter	Compensatory wetland mitigation plan	Supports the mitigation proposed and suggests mitigation credit for future Reaches of HHD could be banked
March 8, 2001 USACE letter	Proposal for wetland habitat loss	Agree functional value of habitat loss should be mitigated. Plan to supplement an existing exotic plant removal program by re-planting the mitigation area with native trees. Request for concurrence
October 30, 2000 USACE letter	The Corps cannot support the mitigation plan outlined by USFWS, but proposes strategy for wetland compensation	The Corps will support exotic plant removal program and investigate enhancement opportunities of existing wetland functions.
February 11, 2000 USFWS Supplement draft CAR	Results of wetland function assessment and mitigation plan proposal	Approximately 35 acres of wetland habitat will be impacted by recommended alternative. Mitigation required. Proposed sites and compensation measures listed. Results of WRAP
June 9, 1999 USFWS Section 7 determination	Determination of effects to threatened and endangered species in project area	Concur with USACE determination of not likely to adversely effect, provided recommendations for the bald eagle and eastern indigo snake are implemented
October 30, 1998 USFWS draft CAR	Draft Environmental Impact Statement	Alternatives 2 and 3 are acceptable, provided mitigation for wetlands is provided; exotic vegetation is removed; Construction avoids active bald eagle nest, protection measures for eastern indigo snake are followed, and impacts to burrowing owls are minimized

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

March 8, 2004

James C. Duck
Chief, Planning Division
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

The Fish and Wildlife Service (Service) has reviewed the additional information submitted by the U.S. Army Corps of Engineers (Corps), dated February 23, 2004, regarding Subreach A of Reach One of the Herbert Hoover Dike (HHD) Major Rehabilitation 30 Percent Design Documentation Report (DDR). This alternative differs from the previously coordinated Value Engineering Report (VER) recommendation by eliminating work in the existing toe ditch. All construction activity (other than temporary dewatering of the toe ditch) would be confined to the immediate lakeside edge of the toe ditch. This letter represents the Service's view of the effects of the proposed action in accordance with the provisions of the Fish and Wildlife Coordination Act of 1958, as amended (FWCA) (48 Stat. 401; 16 U.S.C. 661 *et. seq.)* and section 7 of the Endangered Species Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

FISH AND WILDLIFE COORDINATION ACT

On September 19, 2003, Service biologists returned to inspect Reaches 1, 2, and 3 with project engineer Tracy Hendren. We discussed the subject modifications to the plan now included in the 30 Percent DDR and visited Corps experimental design testing sites during the emergency repairs along the dike. We also inspected the ongoing project mitigation site near Moore Haven.

Your letter stated that the Corps proposes to implement the Alternative 5 design in the DDR. This design, if implemented, will further reduce environmental impacts previously addressed in our Final FWCA report, dated December 20, 2001, and our previous supplemental FWCA report, dated March 4, 2003. No significant impacts are expected on fish and wildlife habitat except for the temporary dewatering of the toe ditch. We are delighted to see the effort the Corps' project engineer has made to minimize potential impacts on fish and wildlife resources. We encourage the Corps to consider similar reduction in impacts along the additional reaches of the HHD.

Because the revised design appears to avoid impacts on wetlands, no mitigation will be required. However, if modifications are made to the project design that potentially impact wetland habitat, further evaluation may be required under the FWCA. This determination applies only to Subreach A of Reach One, and we await notification on design selection for additional reaches of the HHD before we can assess any impacts that may require mitigation in the future. We do not agree with the statement in your February 23 letter that the mitigation project at Moore Haven has been completed. As discussed during our site inspection on September 19, 2003, the Corps has intended to carry out additional removal of melaleuca (*Melaleuca quinquenervia*) saplings and planting of native trees to improve wetland functions at the mitigation site, and this additional work was expected to happen whenever that wetland dried. Although no mitigation debit would need to be applied for Subreach A of Reach One, when the mitigation site is completed, the Corps can bank mitigation credits to compensate for any future impacts on wetlands along the HHD.

THREATENED AND ENDANGERED SPECIES

The Service concurred with the Corps' determination that the project was not likely to adversely affect the threatened bald eagle (*Haliaeetus leucocephalus*) or the threatened eastern indigo snake (*Drymarchon corais couperi*) on June 9, 1999. We must remind you that the Corps' proposed measures to avoid adverse effects on the bald eagle and the eastern indigo snake remain in effect.

Our field inspections indicated the consistent presence of a bald eagle along the HHD between Canal Point and Pahokee at about Mile 10, measuring south from Port Mayaca. This was noted in our draft FWCA report, dated February 11, 2000. Although this nest is located outside of Subreach A, we want to ensure that mobilization of heavy equipment does not disturb this nest. The Corps must search the area for bald eagle nests prior to construction to avoid construction activities that may disrupt nesting. In addition, prior to project construction, the contractor will instruct all personnel associated with the project that eagles and indigo snakes may be present in the area, and the need to avoid harming, harassing, or killing these species and the civil and criminal consequences. Construction activities must be kept under surveillance, management, and control to minimize any interference, disturbance, or impact to these resources.

Based on our review of the information in the 30 Percent DDR, and the Corps' continued acceptance of measures to avoid adverse effects on the bald eagle and the eastern indigo snake, we find there is no need to reinitiate consultation at this time. If modifications are made to the project, or if additional information involving potential effects to listed species becomes available, if a new species is listed, or if designated critical habitat may be adversely affected by the project, reinitiation of consultation may be necessary.

We greatly appreciate your cooperation in this planning effort and thank you for your support in the effort to protect important natural resources. If you have any questions regarding this project, please contact Agustin P. Valido at 772-562-3909, extension 298.

Sincerely yours,

James J. Slack
Field Supervisor
South Florida Ecological Services Office

cc:
Corps, Jacksonville, Florida (Rebecca Weiss)
Corps, Jacksonville, Florida (Tracy Hendren)
Service, Jacksonville, Florida (Miles Meyer)

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

FEB 2 3 2004

Mr. Jay Slack
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960-3559

Dear Mr. Slack:

The U.S. Army Corps of Engineers (Corps), Jacksonville District, is preparing the Final Environmental Impact Statement (EIS) for the Herbert Hoover Dike (HHD) Major Rehabilitation Report. Several Studies have been conducted since the July 1999 draft EIS, including the July 2002 Value Engineering (VE) Study, Emergency Operations conducted in 2003, and the 30% Detailed Design Document of January 2004. The draft EIS and VE report previously had been coordinated with the U.S. Fish and Wildlife Service (Service), Vero Beach office and the Final CAR received. During the emergency operations on the Dike, it was discovered that the VE recommendations would not adequately prevent boils from forming or under-seepage. The 30% detailed designs for the HHD addressed these inadequacies and altered the recommended plan. The 30% Design Documentation Report (DDR) has previously been forwarded to your office for review.

Based on the findings of the 30% Design Report, the Corps is recommending a combination of alternative 5 and 7 in the report. This alternative differs from the previously coordinated VE report recommendation in that it incorporates a relief trench waterward of the toe ditch on the landward Dike slope. As did the VE recommendation, this alternative would reduce total impacts of the project by avoiding changes to the toe ditch with the exception of temporary impacts associated with construction. In addition, mitigation for this project has already been completed. Robert Pace and Agustin Valido have recently inspected the mitigation and project sites with the Corps engineer to discuss the changes in the recommended plan.

The enclosure is a brief description for the alternative recommended for sub-region A of reach 1. The Corps requests the Service to review the submittal and 30% DDR and address any issues in a Supplemental FCAR. We are currently

revising the EIS with the current changes and wish to circulate the Final as soon as practicable. If you have any questions regarding the proposed recommendation or project history, please contact Ms. Rebecca Weiss at 904-232-1577 or rebecca.j.weiss@usace.army.mil. Thank you for you continued attention and support to this matter.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

Copy Furnished:
Robert Pace, U.S. Fish and Wildlife Service, 1339 20th Street, Vero Beach, Florida 32960-3559.

Agustin Valido, U.S. Fish and Wildlife Service, 1339 20th Street, Vero Beach, Florida 32960-3559

Selected Plan for Herbert Hoover Dike
Reach 1, Subreach A

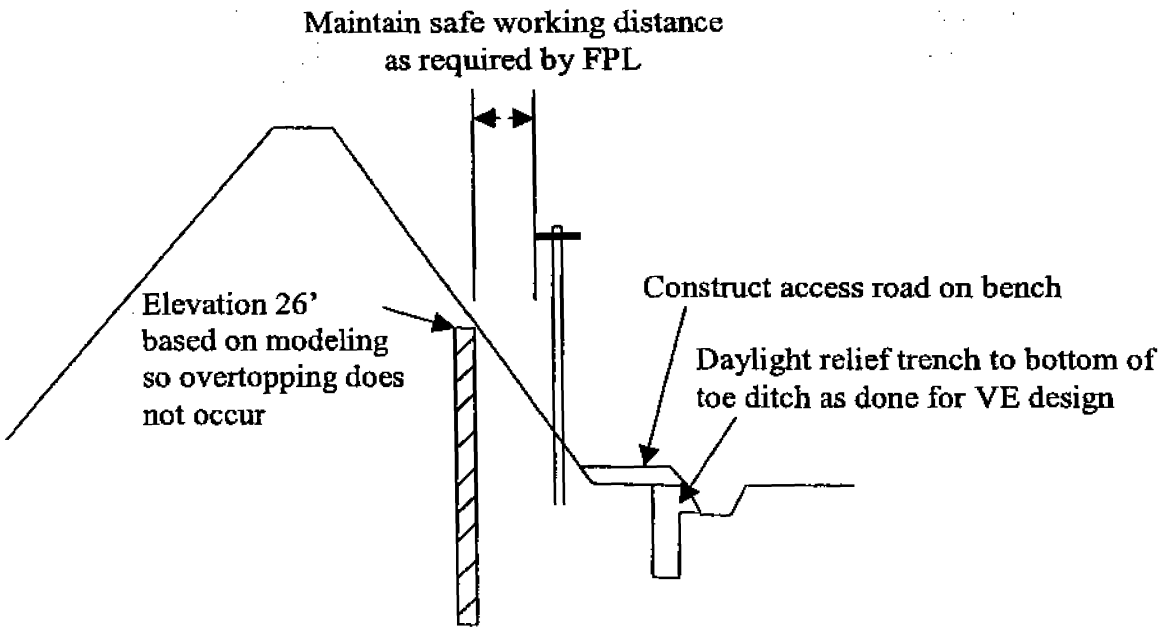
The selected plan as sent in comments to the contractor is the following:

Cutoff trench from Elev. 26 ft-NGVD down to approx. elev. –10 ft-NGVD (This will vary with change in geology)

Rock drain daylighting to invert elevation of the existing toe ditch. The toe ditch will not be widened or deepened from current configuration. The drain will be similar in appearance to the VE solution, but smaller.

The access road originally planned landward of the toe ditch will be located lakeward of the existing toe ditch (no impacts landward of existing toe ditch).

The following figure was sent to the contractor as a template for the selected plan.



United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

October 28, 2003

James C. Duck
Chief, Planning Division
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

The Fish and Wildlife Service (Service) has reviewed additional information submitted by the U.S. Army Corps of Engineers (Corps), dated June 27, 2003, regarding Reach 1 of the Herbert Hoover Dike Major Rehabilitation Evaluation Report, and further information concerning a Value Engineering Report that made modifications to the recommended plan. Moreover, on September 19, 2003, Service biologists conducted an inspection of Reaches 1, 2, and 3 with project engineer Tracy Hendren. We discussed ongoing modifications to the previously proposed design and experimental design testing conducted by Corps staff during emergency repairs along the dike. We also inspected the project mitigation site near Moore Haven.

If the changes to the current plans discussed by Mr. Hendren are approved, the Corps would further reduce potential impact on wildlife resources. In addition, certain proposed design changes (in Reach 2) may result in several miles of restored wildlife habitat and an increased amount of aquatic habitat.

Mr. Hendren informed us that he plans to have the 30 percent design drawings completed during the next few months. After we receive these drawings, we will provide a supplement to our Final Fish and Wildlife Coordination Act Report, in accordance with the provisions of the Fish and Wildlife Coordination Act of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et. Seq)* and section 7 of the Endangered Species Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

We greatly appreciate your cooperation in this project and thank you for your support in efforts to protect fish and wildlife resources. If you have any questions regarding this project, please contact Agustin P. Valido at 772-562-3909, extension 298.

Sincerely yours,

James J. Slack
Field Supervisor
South Florida Ecological Services Office

Branch

Planning Division
Environmental Branch

JUN 27 2003

Mr. Jay Slack
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960-3559

Dear Mr. Slack:

The U.S. Army Corps of Engineers (Corps), Jacksonville District, previously coordinated with the U.S. Fish and Wildlife Service (Service) regarding Reach One of the Herbert Hoover Dike (HHD) Major Rehabilitation Evaluation Report (MRER), and additional information concerning a Value Engineering Report (VER) that made modifications to the recommended plan. Design considerations have been ongoing, as well as testing of the VER design during emergency repairs along the Dike. As a result, the Corps proposes to use the VER recommended design only along Sub-reach 1A, where test trenches have not demonstrated significant problems with underseepage flow. The Corps proposes implementation of the original recommended alternative of the MRER for remainder of Reach One.

The recommended plan of the MRER plan had mitigation associated with its implementation for impacts to wetlands. This mitigation has been completed. The modified plan of the VE study did not require mitigation, as it avoided impacts to the toe ditch wetlands. The Corps proposes as the final recommended plan combining the two designs in order to meet the project objectives to improve structural stability of the Dike, as well as minimizing and avoiding impacts to the majority and highest quality wetlands within the project area.

Attached is a description of the proposed design for each section of Reach One, as well as maps and preliminary design drawings taken from the original DEIS and VER study.

The Corps requests FWS to review the revised alternative and to concur that minimal and temporary impacts to fish and wildlife resources and wetlands are expected as a result of implementation of proposed alternatives and to provide the Service's recommendations as an addendum to the Final Fish and Wildlife Coordination Act Report. The Corps, in accordance with section 7 of the Endangered Species Act of 1973, as amended, also has made the determination that the combined alternatives are not likely to adversely affect threatened or endangered species listed within the project area. The Corps is dedicated to complete the proposed measures to avoid adverse effects on the bald eagle and eastern indigo snake as outlined in the October 30, 1998, draft Fish and Wildlife Coordination Act Report.

We greatly appreciate your ongoing cooperation in this planning and engineering effort. If you have any questions or require more information regarding this project, please contact Mrs. Rebecca Weiss at 904-232-1577 or by electronic mail at rebecca.j.weiss@usace.army.mil. Your assistance is greatly appreciated.

Sincerely,

James C. Duck
Chief, Planning Division

Copy Furnished:

Mr. Agustin Valido, U.S. Fish and Wildlife Service, 1339, 20th Street, Vero Beach, Florida 32960-3559.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

March 4, 2003

James Duck
Chief, Planning Division
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

The Fish and Wildlife Service (Service) has reviewed the additional information submitted by the U.S. Army Corps of Engineers (Corps), dated January 14, 2003, regarding Reach One for the Herbert Hoover Dike (HHD) Major Rehabilitation Report, Value Engineering Report (VER). This letter represents the Service's view of the effects of the proposed action in accordance with section 7 of the Endangered Species Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*) and the provisions of the Fish and Wildlife Coordination Act (FWCA) of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et. seq.).*

FISH AND WILDLIFE COORDINATION ACT

As described in your letter dated January 28, 2002, the Corps proposes to implement the recommendations provided in the VER and incorporated these in the Corps' recommended plan for Reach One of the Herbert Hoover Dike (HHD) Major Rehabilitation Report and Draft Environmental Impact Statement. The VER proposes reduced environmental impacts as previously addressed in our Final Coordination Act Report dated December 20, 2001. Because the revised design appears to avoid impacts on wetlands, no wetland mitigation will be required. However, if modifications are made to the project design that potentially impact wetland habitat, further evaluation may be required under the FWCA.

THREATENED AND ENDANGERED SPECIES

The Service concurred with the Corps' determination that the project was not likely to adversely affect the threatened bald eagle (*Haliaeetus leucocephalus*) or the threatened eastern indigo snake (*Drymarchon corais couperi*) on June 9, 1999. We must remind you that the Corps proposed measures to avoid adverse effects on the bald eagle and the eastern indigo snake remain in effect.

Our field inspections indicated the consistent presence of a bald eagle along the HHD between Canal Point and Pahokee at about Mile 10, measuring south from Port Mayaca. This was noted in our draft FWCA report, dated February 11, 2000. The Corps must search the area for bald eagles nest prior to construction to avoid construction activities that may disrupt nesting. In addition, prior to project construction, the contractor will instruct all personnel associated with the project that endangered species may be present in the area, and the need to avoid harming, harassing, or killing these species and the civil and criminal consequences. Construction activities must be kept under surveillance, management and control to minimize any interference, disturbance, or impact to these resources.

Based on our review of the information in the VER, and the Corps' continued acceptance of measures to avoid adverse effects on the bald eagle and the eastern indigo snake, we find that there is no need to reinitiate consultation at this time. If modifications are made to the project, or if additional information involving potential effects to listed species becomes available, if a new species is listed, or if designated critical habitat may be adversely affected by the project, reinitiation of consultation may be necessary.

We greatly appreciate your cooperation in this planning effort and thank you for your support in the effort to protect important natural resources. If you have any questions regarding this project, please contact Agustin P. Valido at 772-562-3909, extension 298.

Sincerely yours,

James J. Slack
Field Supervisor
South Florida Ecological Services Office

cc:
Corps, Jacksonville, Florida (Paul Stevenson)
SFWMD, West Palm Beach, Florida (Jorge Patino)

Planning Division
Environmental Branch

JAN 1 4 2003

Mr. Jay Slack
U.S. Fish and Wildlife Service
South Florida Office
1339 20th Street
Vero Beach, Florida 32960-3559

Dear Mr. Slack:

The U.S. Army Corps of Engineers (Corps), Jacksonville District, is providing additional information concerning the Value Engineering Report for the Corps' recommended plan for Reach One of the Herbert Hoover Dike (HHD) Major Rehabilitation Report (MRR) and Draft Environmental Impact Statement (DEIS). Enclosed for your review and information is a copy of the report on compact disc.

In summary, the Corps' November 2000 recommended plan for rehabilitation of the HHD Reach One (seepage berm with relief trench along lower portion of the dike toe and filling of the toe ditch) and the February 11, 2000 U.S. Fish and Wildlife Service Supplement to the draft Coordination Act Report with recommendations, was provided to the value engineer (VE) contractor, URS Group, Inc. URS reviewed the documents and rehabilitation criteria and developed the Inverted Filter with Seepage Trench and two other VE alternatives to better fit HHD geometry which resulted in the following:

- Reduced HHD rehabilitation real estate needs by 50%
- Proposed the rehabilitation work be kept on the HHD footprint
- Is compatible with over 50% of the HHD geometry

The Corps has begun the wetland compensation plan as prescribed in the Supplement to the CAR. The clearing of land and acquisition of FWS recommended plants has been done. The plants will be installed when conditions permit. Detailed design reports are being developed by the Corps for each of the four subreaches within reach one based on the three VE alternatives (Exhibits 5.2, 5.3, 5.4) enclosed. The widening of

the HHD toe ditch is being discussed where project lands allow. There would be some temporary construction impacts but additional wetland acreage would be constructed.

The Corps requests you review the enclosed CD and VE concept sketches. The VE study proposes reduced environmental impacts as addressed in the Final Coordination Act Report. The Corps feels additional coordination under the Coordination Act is not necessary. Please direct any questions you may have concerning this project to Mr. Paul Stevenson, telephone number 904-899-5049 or via email at paul.c.stevenson@usace.army.mil.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosures

Copy Furnished wo/encl:

Mr. Jorge Patino, South Florida Water Management District,
3301 Gun club Road, West Palm Beach, Florida 33416

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

December 20, 2001

Colonel James G. May
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attention: Planning Division

Re: Herbert Hoover Dike
Major Rehabilitation Report
(Reach One)

Dear Colonel May:

We are pleased to provide the enclosed final Fish and Wildlife Coordination Act (FWCA) report for the Herbert Hoover Dike Major Rehabilitation report. This report is provided in accordance with the Fish and Wildlife Coordination Act of 1958 (48 Stat. 401, as amended: 16 U.S.C. 661 et seq.) and section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). In a letter dated November 12, 1998, the Florida Fish and Wildlife Conservation Commission provided concurrence with the findings and recommendations in our draft FWCA report. This report constitutes the recommendations of the Secretary of the Interior in accordance with section 2(b) of the FWCA.

We greatly appreciate your cooperation in this planning effort. If you have any additional questions, please contact David Hallac at 561-562-3909, extension 279, or Robert Pace at extension 239.

Sincerely yours,

For James J. Slack
Field Supervisor
South Florida Ecological Services Office

Enclosure

cc:
FWS, ARD-ES Atlanta, GA (Cynthia Dohner)
Corps, Jacksonville, FL (Olice Carter)
Corps, Jacksonville, FL (Carl Dunn)
Corps, Clewiston, FL (Angie Charles)
FWC, Vero Beach, FL (Joe Walsh)

FINAL FISH AND WILDLIFE COORDINATION ACT REPORT

ON THE

HERBERT HOOVER DIKE
MAJOR REHABILITATION REPORT
(REACH ONE)

Prepared by:

Robert T. Pace and David E. Hallac
U.S. Fish and Wildlife Service
South Florida Restoration Office
Vero Beach, Florida

December 11, 2001

I. IDENTIFICATION OF PURPOSE, SCOPE, AND AUTHORITY

The levee system around Lake Okeechobee began as a project of the State of Florida with the construction of 47 miles of low levees in 1927. The River and Harbor Act of July 3, 1930, approved reconstruction and improvement of the levee after the original low levee failed during the 1928 hurricane. Reconstruction of the levees started in 1931 along the south shore of the lake. By 1937, 69.2 miles of continuous levee had been completed around the west, south, and east shores of the lake.

The Flood Control Act of 1948 (P.L. 858, 80th Congress, 2d Session) authorized the first phases of the comprehensive plan to provide flood protection and other water control benefits in central and south Florida. In 1961, the levee system was dedicated and renamed the Herbert Hoover Dike (HHD). The elevation of the HHD was raised and structural improvements were made between 1962 and 1967.

In 1993, the U.S. Army Corps of Engineers (Corps) prepared a special report entitled, "Herbert Hoover Dike, Seepage and Stability Analysis." The present feasibility study, which will result in a Major Rehabilitation Report (MRER), stems from concerns about the stability of the HHD. The emphasis of the current phase of study is Reach One of the HHD (see *Location of the Study Area*, below). The major objectives of the MRER are to: 1) determine the overall engineering condition of the HHD at Reach One; 2) determine the current reliability of all major project features; 3) identify project features which are not reliable; 4) develop methods to remedy or manage the problems; 5) identify environmental concerns; and 6) identify a recommended plan and cost estimate for the plan.

II. DESCRIPTION OF STUDY AREA

A. Location of the Study Area

The HHD system is approximately 143 miles (230 km) long, and is divided into eight segments or "Reaches" for planning purposes. The southeastern segment, Reach One, is the focus of the present study. Reach One is an approximately 22.4 mile (36 km) long segment of the HHD located along the southeast portion of the Lake. This segment extends from the St. Lucie Canal at Port Mayaca, south to the Hillsboro Canal at Belle Glade (Figure 1).

B. Description of the Study Area

The habitat types landward of Reach One have been greatly altered during the last century. Historically, the natural vegetation was a mix of freshwater marshes, hardwood swamps, cypress swamps, and pine flatwoods. Although some of these natural areas still exist, the introduction of controlled drainage for agriculture and land development has resulted in a significantly different set of cover types. Land uses along the landward edge of the levee are largely residential, commercial, or agricultural. Sugarcane fields are located in many cases directly along the landward toe of the HHD or are located a short distance away. Other agricultural uses along the HHD include tree nurseries, small banana plantations, and other fruit groves, especially mangoes.

Residential lots are present along portions of the toe of the HHD, particularly in the cities of Canal Point and Pahokee. The Florida East Coast Railway borders a portion of the HHD, as does the Palm Beach County Glades Airport.

The remaining wildlife habitats consist primarily of wetlands found along the toe ditch and adjacent low-lying areas and are usually a result of impoundment rather than natural hydrology. The majority of these are small, isolated freshwater wetlands which are located in the northern portion of Reach One within the strip of land between the HHD and the transportation corridor (Highway 98/441 and the Florida East Coast Railroad). The toe ditch itself provides some usable wetland habitat along the entire length of Reach One. Typical vegetation in these wetlands includes Carolina willow (*Salix caroliniana*), melaleuca (*Melaleuca quinquenervia*), Brazilian pepper (*Schinus terebinthifolius*), Australian pine (*Casuarina* sp.), water hyacinth (*Eichhornia crassipes*), cattail (*Typha domingensis*), water lettuce (*Pistia stratiotes*), and duckweed (*Lemna* sp.). Although wetlands present on the landward side of Reach One may not be considered high quality ecosystems, they do host a variety of small fishes and invertebrates and provide usable foraging habitat for wading birds.

Waterward of Reach One, there are few wetland areas immediately adjacent to the HHD. Due to dredging activities for the rim canal which parallels the dike, the littoral zone is narrower than would occur naturally. The water depth increases rapidly here, providing less than optimal habitat. Beyond the rim canal, however, large freshwater marshes are still found waterward of Reach One. These are primarily around Kreamer and Torry Islands which are located near the southern extent of Reach One, and provide several thousand acres of valuable habitat.

III. FISH AND WILDLIFE RESOURCES OF CONCERN IN PLANNING

A. Introduction

The fish and wildlife resources of Lake Okeechobee are of remarkable value, including threatened and endangered species, abundant waterfowl, an exceptionally productive recreational fishery, and commercial fisheries. The commercial fisheries generate $6.3 million annually, and consist of a trotline fishery for catfish (*Ameriurus* spp. and *Ictalurus* spp.), and a haul seine fishery for catfish and bream (*Lepomis* spp.) (Bell 1987). The recreational fishery generates $22.1 million annually and has an estimated asset value of $100 million (Bell 1987). Waterfowl and alligator hunting are also important recreational and commercial activities in the lake.

The Fish and Wildlife Service (Service) has great interest in the protection and enhancement of fish and wildlife resources within Lake Okeechobee. However, the preferred design of this project should have negligible effect on habitat conditions on the lakeshore side of the HHD. Our description of affected resources and fish and wildlife concerns in this FWCA report concentrates on those resources found on either the HHD itself or the areas to be affected by construction of the preferred alternative immediately to the landward side of the HHD.

B. Fish and Wildlife Resources

Wading birds are commonly observed on both the landward and waterward sides of the HHD, indicating a viable population of small fishes and invertebrates along either toe of the dike. Wading birds observed include great blue heron (*Ardea herodias*), great egret (*Casmerodius albus)*, little blue heron (*Egretta caerulea*), tricolored heron (*E. tricolor*), snowy egret (*E. thula*), cattle egret (*Bubulcus ibis*), white ibis (*Eudocimus albus*), and wood stork (*Mycteria americana*). Other birds observed along the waterward side of the HHD included the snail kite (*Rostrhamus sociabilis plumbeus*), black skimmer (*Rynchops niger*), brown pelican (*Pelecanus occidentalis*), double-crested cormorant (*Phalacrocorax auritus*), and anhinga (*Anhinga anhinga*).

Within the waters of the lake, important species contributing to the sport and commercial fisheries include largemouth bass (*Micropterus salmoides*), catfish (Ictaluridae) black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), redeared sunfish (*Lepomis microlophus*), and Florida gar (*Lepisosteus platyrhincus*). Although some of these larger species may be present in the borrow pit on the landward side of the HHD (Figures 3 and 4), the shallow wetlands along most of the length of the landward side of the levee are most likely inhabited by smaller marsh inhabiting fishes, such as the ubiquitous mosquitofish (*Gambusia holbrooki*), least killifish (*Heterandria formosa*), and sailfin mollie (*Poecilia latipinna*).

Several species of reptiles and amphibians are likely to inhabit the shallow wetlands and the deeper borrow pit along the landward side of the HHD, where project impact will occur. The Service has not surveyed these areas for reptiles and amphibians, but we anticipate the presence of several species of turtles and frogs, and the American alligator (*Alligator mississippiensis*).

C. Threatened and Endangered Species

Based on the Corps' agreement (letter dated November 30, 1998) to implement the protective measures for the Eastern indigo snake and bald eagle, the Service concurred (Service 1999) with the Corps' determination of not likely to adversely affect threatened and endangered species or designated critical habitat.

1. Federally Listed Species

The following federally listed threatened and endangered species were considered in this informal consultation:

Trichechus manatus	West Indian manatee	Endangered
Haliaeetus leucocephalus	Bald eagle	Threatened
Rostrhamus sociabilis plumbeus	Snail kite	Endangered
Mycteria americana	Wood stork	Endangered
Drymarchon corais couperi	Eastern indigo snake	Threatened
Cucurbita okeechobeensis	Okeechobee gourd	Endangered

As noted above, the endangered wood stork and the endangered snail kite are known to occasionally feed in the wetlands to be affected along the landward side of the HHD. However, the principal habitats in the area for both of these species are located within the littoral zone of Lake Okeechobee, and the project is not expected to affect these habitats. Neither species is known to nest close to Reach One.

The West Indian manatee is known to inhabit Lake Okeechobee. Since the manatee only inhabits the lake itself, and because construction associated with the planned alternatives will occur along the landward base and crown area of the HHD, no protective measures are required.

The bald eagle may be of greatest concern with regard to the proposed alternatives. Two nests have been reported and entered into the Florida Natural Areas Inventory (FNAI) database. One of the nests is near Belle Glade and is approximately 5 miles from the southern-most edge of Reach One. The other nest is near the City of Pahokee, in proximity to Reach One of the HHD. This nest has been classified as active from 1990 through 1995, although no chicks have been produced from it for the same time period. A bald eagle nest must be inactive for five years to be considered abandoned (Service 1987).

Prior to detailed design of the proposed project, and again before issuance of any contracts for construction, the Corps should have a qualified biologist survey up to 1 km from the construction site to determine the exact location of any bald eagle nests and research their history of activity within the preceding five years (Service 1987). The previously reported locations for the two nests mentioned above would be the starting point for these surveys, but it is important to recognize that an established nesting territory for a pair of bald eagles may contain several alternate nest sites. It is also possible that in the years before completion of detailed design and initiation of construction, an entirely new breeding pair of eagles may establish a nest site within the zone of disturbance of the proposed project. Therefore, the surveys should not be limited to the previously known nest sites. Specific recommendations to protect any bald eagle nests should be determined on a case-by-case basis. A 750-foot primary zone and, as a minimum, a 750-foot secondary zone should be established around any active nests. Construction should not occur within 1,500 feet of an active nest during the nesting season, which normally lasts from October 1 to May 15. A specific bald eagle management plan should be prepared and reviewed by the Service 6 months to one year prior to mobilization of construction.

The threatened Eastern indigo snake is known to occur in the vicinity of the HHD, as evidenced by FNAI records. Standard protective measures for the Eastern indigo snake include display of educational posters at construction staging areas and instruction of crew members in protection measures. Construction crews should be informed of the protected status of the species and should be instructed to allow any Eastern indigo snakes to escape unharmed if they are flushed by construction activity.

Although the endangered Okeechobee gourd is known to occur on Torry Island, we do not anticipate any effect on the species if the selected alternative restricts construction to the crown and landward side of the HHD.

2. State Listed Species

In addition to the species mentioned above, a number of other species listed by the State of Florida as threatened, endangered, or of special concern are likely to be present in the project area. These include the following:

Ajaia ajaja	Roseate spoonbill	SSC
Aramus guarauna	Limpkin	SSC
Egretta caerulea	Little blue heron	SSC
Egretta rufescens	Reddish egret	SSC
Egretta thula	Snowy egret	SSC
Egretta tricolor	Tricolored (=Louisiana) heron	SSC
Eudocimus albus	White ibis	SSC
Grus canadensis pratensis	Florida sandhill crane	T
Pelecanus occidentalis	Brown pelican	SSC
Speotyto cunicularia	Burrowing owl	SSC
Alligator mississippiensis	American alligator	SSC

Although the Corps should consult with the Florida Fish and Wildlife Conservation Commission (FWC) about any specific recommendations with regard to these species, the Service is aware of the FWC's particular concern about protecting burrowing owls, which may be present along Reach One of the HHD. Burrowing owl nests were documented as occurring along other portions of the HHD in the late 1980s (M. Poole, FWC, personal communication 1998), and we recommend that surveys be conducted to determine if burrowing owl nests are found in Reach One. If nests are found along Reach One, modifications of timing or location of activity may be needed to avoid taking of nests. Burrowing owl nests are generally inactive between July 10 and February 15. Flagging placed at least 10 feet around burrows, combined with education of construction workers to avoid those areas, might avoid direct destruction of burrows, although disturbance around the burrows may be unavoidable. Please contact the Nongame Wildlife Section Supervisor of the FWC in Tallahassee for specific protection measures to protect the burrowing owl.

IV. SUMMARY OF PLAN SELECTION PROCESS, AND IDENTIFICATION OF EVALUATED ALTERNATIVES

The Corps has become increasingly concerned about the seepage and stability of the HHD since the 1994-1995 high water event. Boils and pipings were observed in 1995 at several sites along Reach One. The 1997-1998 El Niño also raised water stages in Lake Okeechobee. The Corps has described several alternatives to address this problem:

No Action Alternative This would allow the continued potential for unsatisfactory performance of the HHD along Reach One.

Alternative 1 This alternative involves construction of a stability berm at the landside toe of the levee and installing culverts with automatic/manual gates and pumps to control the water level in the ditches. During high lake stage events, water levels landward of the dike would be raised in order to reduce differential head, and increase dike stability.

Alternative 2 This alternative involves construction of an upstream impervious cutoff wall and a landside stability berm at the toe of the levee which would impede groundwater flow and control under-seepage.

Alternative 3 (The Corps's Preferred Alternative) This alternative entails installation of a seepage berm with relief trench along the lower portion of the landward toe of the embankment.

V. FISH AND WILDLIFE RESOURCE CONCERNS AND PLANNING OBJECTIVES

The Service's principal concern has been to avoid any disposal of fill material or armoring of shoreline along the littoral zone of Lake Okeechobee, which would have significant adverse impact on fish and wildlife resources. Filling or excavation of wetlands along the landward side of the HHD is of lesser concern, but is a significant enough loss of habitat to require compensatory mitigation. A secondary concern would be the impact of excavation or earth movement along the waterward slope of the HHD; although this would not directly eliminate littoral zone habitat, the Service would be concerned about potential erosion of soil into the lake and/or increased input of dissolved nutrients. A third level of concern involves the indirect impact of disturbance on fish and wildlife in the project area; these concerns are discussed above, particularly with respect to the bald eagle, the Eastern indigo snake, and the burrowing owl.

VI. PROJECT IMPACT EVALUATION

A. Evaluation Framework

The Service has evaluated wetland functions and values to be affected by the project in accordance with the Wetland Rapid Assessment Procedure (WRAP) (Miller and Gonsalus 1997). The linear wetlands along the toe of the HHD are not readily identifiable at the map scale used by the National Wetlands Inventory or the landuse coverages available from the South Florida Water Management District (SFWMD). The Service made a preliminary selection of potential WRAP polygons from inspection of 3-meter resolution Digital Orthophoto Quarter Quads (DOQQs) (1996 images). Based on 1998 field inspections prior to issuance of the Draft FWCA report, and based on interpretation of the DOQQ images, the wetlands at the northern end of Reach One (just south of Port Mayaca) were known to be more diverse and of higher quality than in the southern

portion of the project, where wetland values were reduced and quite similar for greater distances along the HHD. On this basis, the Service decided to begin the WRAP evaluations at the northern end of the project, where evaluation points needed to be more closely spaced.

Sites for WRAP evaluations were selected from these initial locations during the field inspection on November 3, 1999. The values at these sites were extended to polygons of appropriate length along the HHD, according to places where transitions in environmental conditions occur. The WRAP team was composed of the following members: Mark Ziminske, Corps, Jacksonville; Angie Charles, Corps, Clewiston; Tim Towles, Florida Fish and Wildlife Conservation Commission, Vero Beach; David Ferrell, Service, Vero Beach; and Robert Pace, Service, Vero Beach. In addition to observation of emergent vegetation and birds, dip netting at each site assisted in estimating the value of each wetland as habitat for fish and aquatic invertebrates.

A second field inspection was conducted on January 19, 2000. Its purpose was not to further evaluate existing wetland functions, but to establish the following: 1) a more informed estimation of the location and extent of project impacts as interpreted by the Project Engineer, Pete Grace; 2) confirmation of points along the project where WRAP polygons begin and end (transition in habitat conditions); 3) greater focus on identifying potential sites for creation of compensatory wetlands; and 4) orientation of the Corps biologist, Olice Carter, to outstanding environmental issues for the project. The second field inspection included Mr. Grace, Mr. Carter, Ms. Charles, and Mr. Pace. Locations of observations were measured as miles south of the southern end of Port Mayaca.

Based on current plans (prior to detailed design), Mr. Grace advised the Service to evaluate impacts based on deposit of fill on average 30 feet beyond the current toe of the HHD. This would completely eliminate any canal or ditch present along the toe and, in some portions of the project, would also impact a narrow strip of wetlands beyond the canal or ditch.

Area measurements for WRAP polygons (both existing conditions and the proposed compensatory mitigation sites) were calculated by multiplying widths of features observed in the field by length measurements using Arcview software, based on the DOQQs and other digitized data sets, particularly landuse, and hydrography.

B. Fish and Wildlife Resources Without the Project

The Service anticipates that the proposed work in Reach One could be completed within 10 years, so we have selected the year 2009 as the planning horizon for this project. The future without project conditions are expected to be similar to the existing conditions. The Corps and the SFWMD are considering changes to the Lake Okeechobee regulation schedule. Although small changes in the regulation schedule for Lake Okeechobee can provide broad benefits to fish and wildlife on a large scale across the extent of the lake, no major habitat shifts are expected close to the Lake Okeechobee rim canal within Reach One of the HHD. Our field inspection revealed that limited control of melaleuca has occurred along the waterward side of some portions of the HHD,

but extensive stands of melaleuca are still present, particularly along the Lake Okeechobee rim canal near Torry Island. Although some additional melaleuca control is likely to occur in Lake Okeechobee without the proposed project, current efforts are concentrated in the extensive interior marshes of the lake, with no immediate plans to address the densest stands along the rim canal. Except for some increase in residential and commercial development in the cities of Pahokee and Belle Glade, no major changes in land use are anticipated along the landward side (toe ditch) of the HHD. The area is likely to remain largely rural, with extensive areas of sugarcane and scattered plots of fruit trees and vegetables along major portions of Reach One of the HHD.

C. Project Impacts

Through early coordination between the Service and the Corps, initial concerns regarding the direct impact of the alternatives on the littoral zone of Lake Okeechobee have been eliminated. None of the considered alternatives would directly disturb the lakeshore toe of the HHD. The impacts of the considered alternatives are briefly summarized below.

No Action Alternative The No Action Alternative would cause no additional direct or indirect impacts to fish and wildlife in the project area, beyond the existing maintenance activities for the HHD. However, the current instability problems would most likely increase and would be unsatisfactory to the Corps. Should these problems result in partial failure of the HHD, the implications to fish and wildlife landward of the HHD would be limited to the areas of the breach and immediately adjacent habitats, and the effects would likely be of short duration. The expected drop in water levels in Lake Okeechobee due to a partial failure of the HHD would likely be gradual and not so extreme as to cause major environmental damage to the lake's littoral zone.

Alternative 1 Excavation necessary for installation of the gated culvert system and stability berm would cause a temporary loss of wetland habitat located along the landward toe of the HHD. The raised water levels during high lake water events however, may result in larger wetland areas, increasing the potential area of fish and wildlife habitat. As water levels recede in the ditch at the landward toe of the HHD, wading birds might be attracted to feed following a high stage event in the lake. The overall fish and wildlife habitat value of these ditches would depend on to what extent dense native vegetation (such as cattail) and/or exotic vegetation (such as Brazilian pepper) would be allowed to grow in the ditches. Overly dense growths of vegetation would likely reduce the diversity of wildlife finding preferred habitat in the ditch. Because the habitat value of the existing wetlands along the toe ditch of the HHD is reduced by the dense growth of exotic species, the habitat value of the replacement ditch likely would compensate for the temporary loss of the existing habitat, provide that a program to control exotic species is instituted for the replacement ditch.

Alternative 2 Excavation and filling necessary for installation of the stability berm (up to 30 feet wide) will cause some loss of wetland habitat located along the landward toe of the HHD, which would require compensatory mitigation. This alternative is not preferred by the Corps primarily due to the cost of constructing the cutoff wall. The Service does not prefer this alternative because installation of the cutoff wall would require major excavation and deposit of material along the waterward slope of the HHD, increasing the threat of erosion of material into Lake Okeechobee. Even if erosion barriers were placed along the construction site, some nutrient-laden runoff would likely reach the lake. All of the other considered alternatives would not require disturbance of the well stabilized grassy slope on the waterward slope of the HHD.

Alternative 3 (The Corps's Preferred Alternative) Converting existing toe ditches to a controlled system of covered culverts as part of a seepage berm would eliminate existing wetlands within an estimated 50-foot wide right of way of the current toe of the HHD. Compensatory mitigation is under way for this loss.

VII. EVALUATION AND COMPARISON OF THE SELECTED PLAN AND EVALUATED ALTERNATIVES

A. Factors Considered in Impact Evaluation

The following matrix provides a comparison of the environmental protection measures recommended by the Service for each of the alternatives (other than the No Action Alternative)

	Compensatory Wetland Mitigation	Exotic Vegetation Control	Erosion Control Along Lakeshore Slope	Water Quality Monitoring in Lake	Measures to Avoid Disturbance of Wildlife
Alternative 1	None	In replacement toe ditch	Yes	Yes	Yes, greater area than Alts. 2 & 3
Alternative 2	Yes	In compensatory wetlands	No	No	Yes
Alternative 3	Yes, probably greater than Alt. 2	In compensatory wetlands	No	No	Yes

The Service recommends against selection of Alternative 1 due to the greater area of potential construction disturbance for wildlife such as the burrowing owl and the Eastern indigo snake. We

also recommend against Alternative 1 due to the potential for sediment erosion and dissolved nutrient impacts on Lake Okeechobee.

Due to its greater width of excavation and filling along the landward toe of the HHD, Alternative 3 would likely require a greater area of compensatory mitigation than Alternative 2, but either of these alternatives would be acceptable to the Service, provided the compensatory mitigation recommended below is carried out.

B. Wetland Functional Assessment

The WRAP scores support the observation that wetland function generally declines from north to south along Reach One (Table 1). In the north, a wide and deep canal runs along the toe of the HHD. This provides nearly permanent aquatic habitat for organisms, supporting not only small forge fishes but large predatory fishes, alligators, and turtles. The northern canal is also well buffered from disturbance, with forested wetlands to the east and no adjacent urban or agricultural lands. Water quality in the northern portions of Reach One was considered to be good. The willow-dominated (*Salix caroliniana*) community at the northern end of Reach One was evaluated as having the highest functional index (.75) in the project. Other wetlands in the northern portions were dominated by the exotic Brazilian pepper (*Schinus terebinthifolius*), and were given a lower index of .58. Proceeding south towards Pahokee, the canal adjacent to the toe of the HHD became generally narrower; its water quality was considered to be adversely affected by dense coverage of floating vegetation, particularly the exotic water hyacinth (*Eichhornia crassipes*); and the proximity of a railroad eliminated the buffer to the east. Adjacent to the urban portions of Pahokee, little or no wetlands were found adjacent to a narrower ditch at the base of the HHD, buffers were absent to the east, and water quality was reduced. The lowest functional value was assigned to a lengthy portion in the southern end of Reach One where a narrower and shallower ditch followed the base of the HHD, with adjacent sugarcane. Although this ditch supported growth of periphyton and contained small fish that could be consumed by wading birds, the diversity of aquatic animals it could support was considered to be reduced by the fact that it was likely to dry completely in times of drought. This would make it less suitable for larger predatory fishes, alligators, and some species of turtles.

C. Evaluation of Proposed Compensatory Mitigation.

In a letter, dated March 8, 2001, the Corps provided a description of the strategy to compensate for unavoidable impacts to wetlands anticipated in Reach One of the Herbert Hoover Dike Major Rehabilitation Feasibility Study. A Service biologist first visited the proposed compensation area with Corps personnel on February 15, 2001.

The Corps has initiated the removal of exotic vegetation (primarily melaleuca) in a wetland approximately 44.2 acres in size adjacent to the Lake Okeechobee Rim Canal in the vicinity of Moore Haven (Figure 2). On December 3, 2001, Service biologists visited the site and observed the progress of exotic vegetation removal; all mature melaleuca trees had been cut down and

consolidated for burning and a very low density of young melaleuca saplings were apparent. Although that work is not associated with the Herbert Hoover Dike Project, the Corps proposes to supplement that project by planting native trees and shrubs in the treated area as compensation for the anticipated wetland impacts. The native trees and shrubs to be planted include bald cypress (*Taxodium distichum*), pond apple (*Annona glabra*), coastal plain willow (*Salix caroliniana*), wax myrtle (*Myrica cerifera*), salt bush (*Baccharis* spp.), and red maple (*Acer rubrum*).

Using our planting recommendations listed below (Section VIII), the Service supports this concept, which if successful, would be likely to adequately compensate for the anticipated wetland losses for Reach One of the Herbert Hoover Dike Rehabilitation project.

We were unable to assemble a WRAP team to evaluate the compensatory mitigation site before melaleuca clearing was initiated. Based upon WRAP evaluations of similar dense mature melaleuca-forested wetlands, near the Pennsuco wetlands in Miami-Dade County, we have assigned a functional index of 0.40 to the initial condition of the wetlands (Service 2001). We used ArcView Software and Digital Orthophoto Quarter Quads (DOQQs) (1996 images) to analyze the proposed compensatory mitigation site. We measured the area of the compensatory mitigation site to be 44.2 acres (Figure 2).

The compensatory mitigation site is expected to result in a native forested wetland with interspersed open water after complete exotic vegetation removal and planting of native vegetation at appropriate elevations. Thus, contingent upon the above recommendations, the Service has attempted to estimate potential credit for functional "lift". If we assume that a future functional index of 0.90 will be reached at the mitigation site, this would provide 0.50 "lift" relative to the original 0.40. The estimated lift will require documentation by a WRAP team after native re-vegetation is complete. The 0.50 credit on 44.2 acres would result in a gain of 22.1 functional units. The 22.1 functional units would compensate for the debit of 18.9 functional units and includes an additional 3.2 functional units which may provide credits to compensate for additional wetland losses in future reaches of the Herbert Hoover Dike Rehabilitation project

VIII. RECOMMENDATIONS AND SUMMARY OF POSITION

The Service finds the Corps's selected plan to be acceptable, provided that:

1) compensatory wetland mitigation will be provided for unavoidable losses of wetlands;

2) control of exotic vegetation will be carried out in perpetuity in the compensatory wetlands;

3) construction will be scheduled to avoid activity within 1500 feet of any active bald eagle nest during the nesting season;

4) standard protective measures will be carried out to avoid wounding or killing Eastern indigo snakes;

and

5) if burrowing owls are found to be present in the project area, impacts will be minimized by altering construction schedules to avoid the nesting season and/or burrows will be cordoned off to avoid their direct destruction.

We offer the following recommendations to increase the likelihood of maximizing compensatory wetland functions and values at the compensatory mitigation site:

1. The Service had initially recommended aerial spraying of herbicide over the entire area to inhibit germination of exotic plants from the seed bank. However, melaleuca saplings were not found in significant numbers during our December 3, 2001 inspection. Therefore, hand picking should be used to prevent further proliferation of melaleuca. Treatments of exotics would likely be required at least once a year for no less than five years.

2. Either remote surveys using Light Detection and Ranging (LIDAR) technology or a ground-based survey methodology will assist in creating a detailed planting plan in accordance with the micro-topography of the site. Planting the most appropriate species along landscape contours of differing hydroperiod will improve survival of the plants. More specifically, we provide the following planting recommendations:

A. Plant bald cypress on higher elevations in roughly circular stands (cypress domes) that approximate the size of the existing bald cypress stand that was not cleared within the compensatory mitigation site.

B. Plant pond apples in lower elevation areas as rings around the edges of bald cypress domes.

C. Plant red maple trees at the highest elevations and along the edges of the compensatory mitigation site.

D. Maintain small areas (clearings less than 0.5 acres in size) of open water areas at the deepest locations.

3. A Wetland Rapid Assessment Procedure (WRAP) team should visit the site once a year for five years after planting to determine the functional value of the wetland relative to anticipated impacts of the Herbert Hoover Dike project.

IX. LITERATURE CITED

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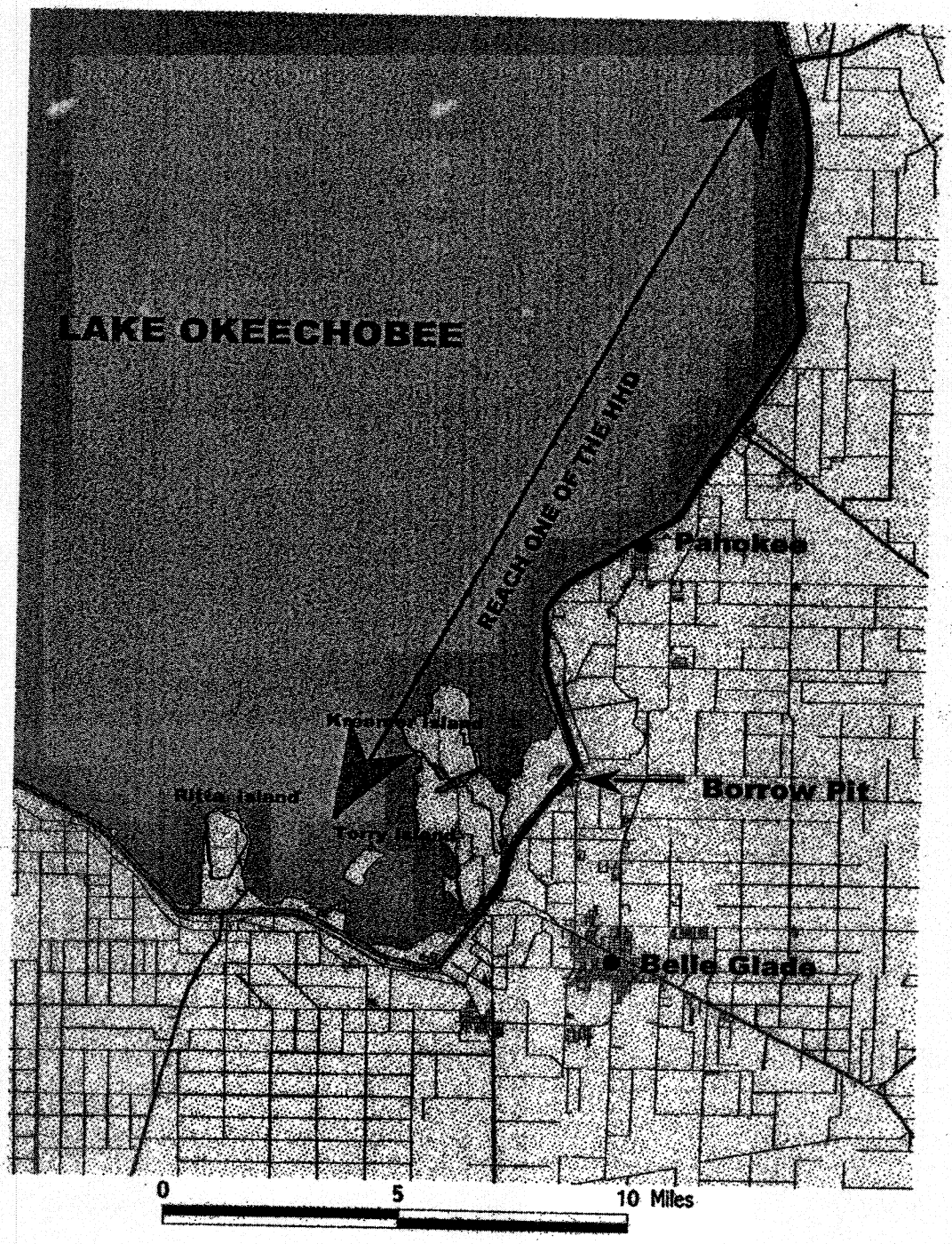


Figure 1. Reach One of the Herbert Hoover Dike Major Rehabilitation Project

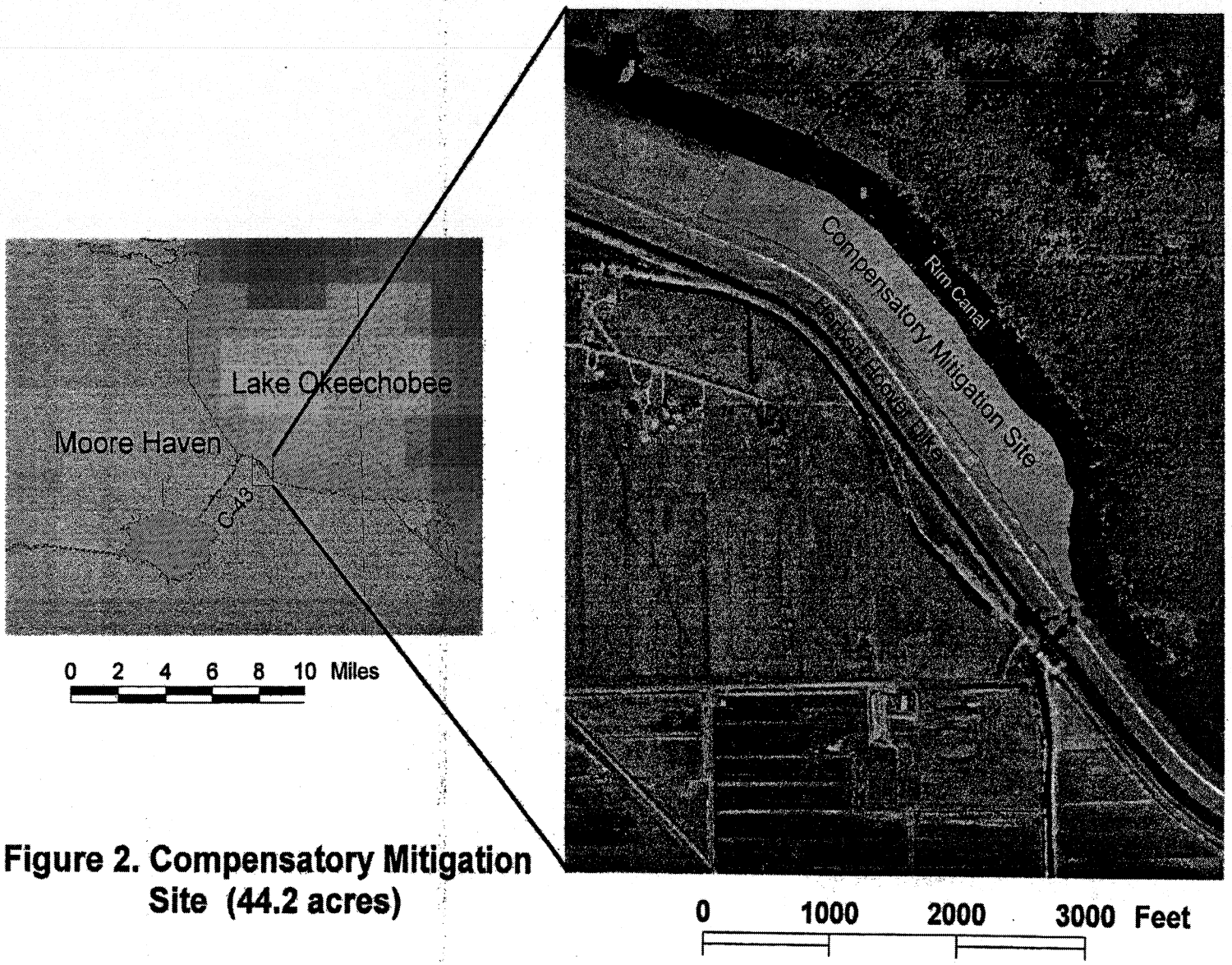


Figure 2. Compensatory Mitigation Site (44.2 acres)

Table 1. Existing wetland functions to be lost through construction of Reach One of the Herbert Hoover Dike rehabilitation project.

Polygon Number	Evaluation Location[1]	Descriptor[2]	WRAP Score	Length (Feet)	Width (Feet)	Area (Acres)	Functional Units
1	0.2	willow	0.75	1,313	10	0.30	0.23
2	0.5	canal	0.62	4,320	20	1.98	1.23
3	0.5	*Schinus*	0.58	2,992	10	0.69	0.40
4	1.2	canal	0.57	4,970	15	1.71	0.98
5	1.7	*Schinus*	0.58	970	15?	0.33	0.19
6	2.1	marsh/shrub	0.67	3,896	10	0.89	0.60
7	2.1	canal	0.55	9,358	20	4.30	2.36
8	3.5	canal	0.65	3,425	20	1.57	1.02
9	3.5	marsh	0.55	5,624	10	1.29	0.71
10	5.0	canal	0.57	6,463	15	2.23	1.27
11	6.0	ditch	0.53	14,652	10	3.36	1.78
12	8.4	canal	0.65	18,483	15	6.37	4.14
13	12.9	ditch, urban area	0.47	14,327	12	3.95	1.86
14	15.1	ditch at airport	0.57	8,022	8	1.47	0.84
15[3]	19.0	ditch, beside sugar cane	0.32	22,113	8	4.06	1.30
					Total Functional Units		**18.90**

[1]Expressed as miles south of Port Mayaca; see map.

[2]We have used the term "canal" for water conveyances 15 feet or greater in width, while narrower (and generally shallower) conveyances are termed "ditches."

[3]Includes roadside swale (from approx. mile 16.7 to mile 18.0), which was determined not to meet the definition of a regulatory wetlands

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

March 21, 2001

Mr. James C. Duck
Chief, Planning Division
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

Thank you for your letter, dated March 8, 2001, providing a description of the Corps of Engineers' (Corps) strategy to compensate for unavoidable impacts to wetlands anticipated in the Herbert Hoover Dike Major Rehabilitation Feasibility Study. A Fish and Wildlife Service (Service) biologist visited the proposed compensation area with Corps personnel on February 15, 2001.

The Corps has initiated the removal of exotic vegetation (primarily *Melaleuca quinquenervia*) in a wetland approximately 30 acres in size adjacent to the Lake Okeechobee Rim Canal in the vicinity of Moore Haven. Although that work is not associated with the Herbert Hoover Dike Project, the Corps proposes to supplement that project by planting native trees and shrubs in the treated area as compensation for the anticipated wetland impacts. The native trees and shrubs to be planted include bald cypress (*Taxodium distichum*), pond apple (*Annona glabra*), coastal plain willow (*Salix caroliniana*), wax myrtle (*Myrica cerifera*), salt bush (*Baccharis* spp.), and red maple (*Acer rubrum*).

The Service supports this concept, which if successful, would be likely to adequately compensate for the anticipated wetland losses for Reach 1 of the Herbert Hoover Dike project, and possibly could be provide additional credits that could be banked in anticipation of additional wetland losses in future reaches of the Herbert Hoover Dike project.

We offer the following recommendations to increase the likelihood of maximizing compensatory wetland functions and values in the area:

1. Following physical clearing of *Melaleuca* and other exotic vegetation from the area, and before planting of native trees and shrubs, aerial spraying of herbicide over the entire area would likely inhibit germination of exotic plants from the seed bank. This will reduce, but not eliminate, the need for follow-up treatments of seedlings of undesirable plants. Follow-up treatments of exotics would likely be required at least once a year for no less than five years.

2. Following clearing of the site, either remote surveys using Light Detection and Ranging (LIDAR) technology or a ground-based survey methodology will assist in creating a detailed planting plan in accordance with the micro-topography of the site. Planting the most appropriate species in areas of differing hydroperiod will improve survival of the plants.

3. A Wetland Rapid Assessment Procedure (WRAP) team should visit the site one year, two years, and five years after planting to determine the functional value of the wetland relative to anticipated impacts of the Herbert Hoover Dike project.

Thank you for the opportunity to review your conceptual compensation plan. Any additional questions on this matter should be directed to Robert Pace at 561-562-3909.

Sincerely yours.

James J. Slack
Field Supervisor
Fish and Wildlife Ecological Services

Planning Division
Environmental Branch

Mr. James J. Slack
Field Supervisor
U S Fish and Wildlife Service
P.O. Box 2676
Vero Beach, Florida 32961-2676

Re: Herbert Hoover Dike Proposed Compensation Plan

Dear Mr. Slack:

Since our letter of 30 October 2000 responding to the supplement of the draft Fish and Wildlife Coordination Act report, our respective agencies have had continuous dialog regarding potential cumulative impacts to wetland usage along the toe of the Herbert Hoover Dike at Lake Okeechobee in south central Florida. Though we do not agree on mitigating any loss of vegetation that has been created solely on water seepage through the dike, the Corps recognizes the functional value of such vegetation in that area.

Therefore, U.S. Army Corps of Engineers is proposing a plan that we feel would adequately compensate for loss of wetland vegetation resulting from rehabilitation activities to Reach One of the Herbert Hoover Dike. This plan proposes the removal of exotic plant species and the replanting of developed native vegetation in a 30-acre area between Culvert 1 and Structure 77 along the toe of the Herbert Hoover Dike. This plan will ensure higher success rates of replanting efforts while augmenting the existing Exotic Plant Removal/Treatment program around the Lake.

Description

In 1999, the U.S. Army Corps of Engineers, Jacksonville District (Corps), with assistance from the South Florida Water Management District, initiated an Exotic Plant Removal/Treatment Program along the perimeter of Lake Okeechobee. Large areas of invasive, exotic vegetation such as melaleuca (*Melaleuca quinquenervia*), Brazilian pepper (*Schinus terebinthifolius*), and Australian pine (*Casuarina equisetifolia*), have been removed and/or treated in this area. In conjunction with this program seedlings of more favorable native vegetation, specifically bald cypress (*Taxodium* spp.), pond apple (*Annona glabra*),

wax myrtle (*Myrica cerifera*), salt bush (*Baccharis* spp.), and red maple trees (*Acer rubum*), have been planted to replace the less desirable exotic plants.

Forecasts for 2001 include continued treatment for *Melalueca* monocultures and the removal of other exotic vegetation in areas around the lake. Re-planting efforts are planned to continue with approximately 600 red maple, wax myrtle, and salt bush trees along Indian Prairie Canal. Though the exotic removal program has been in existence for a couple of years, there remains uncertainty as to the availability and amount of future funding.

Problem

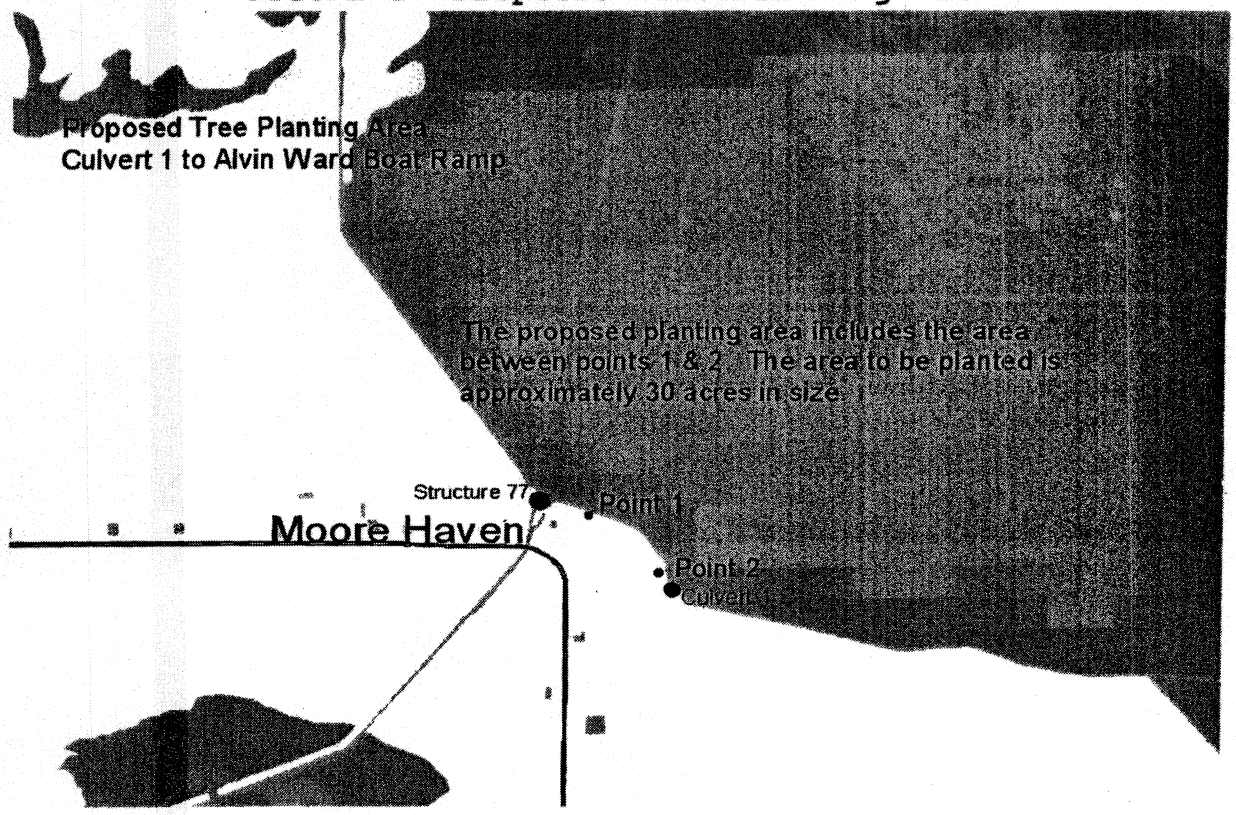
Approximately seven thousand native trees have been planted since the inception of this program. Unfortunately, the long-term success of newly planted native vegetation has been quite low. Although some areas have experienced a relative high survival rate of approximately 60%, other sites have reported only 20% planting survival. Based on in-situ observations, the average survival rate is estimated at 25% to 30%. This is due to various factors such as an insufficient water supply and the type of terrain or soil composition at the planting location. Most important, however, appears to be the size or maturity level of the containerized vegetation at the time of planting. Optimal plant container size is 3 to 15 gallons; however, those sizes in large quantities are cost prohibitive for the program's present budget. The size and root structures of many of the 1-gallon plants appear too underdeveloped to successfully withstand natural stresses.

Proposed Actions

The Corps proposes to augment the Exotic Plant Removal/Treatment Program by supplementing the quantity and size of containerized native vegetation with the intent of increasing plant survival rates. With the assistance of U.S. Fish and Wildlife Service, a suitable replanting site has been selected in the area between Culvert 1 and Structure 77 along the toe of the Herbert Hoover Dike. This area is approximately 30 acres in size. The different types of plants proposed include willow (*Salix* spp.), red maple (*Acer rubrum*), bald cypress (*Taxodium distichum*), and pond apple (*Annona glabra*). To increase survival rates, the minimum size trees to be planted shall be no smaller than 3 gallons. Seven and 15-gallon trees will also be used to provide variations in size and age. The optimal planting

time would be during the rainy season (July-August) prior to anticipated rising water levels in the lake (see figure 1).

FIGURE 1: Proposed Tree Planting Area



We are seeking concurrence that this proposal is an acceptable strategy that will allow your agency to provide us a final Fish and Wildlife Coordination Act report. We feel confident that this plan will (a) offset any loss of vegetation from the construction activities of Reach One, (b) provide the positive environmental benefits both our agencies are striving for, and (c) can serve as a viable compensation strategy for other vegetation losses resulting from future rehabilitation efforts associated with Herbert Hoover Dike.

We appreciate the Service's patience and coordination during this process and would like to reiterate our commitment to mutual resolution. If you have any questions or need any additional information, please contact Mr. Olice Carter at (904) 232-2259 or Mr. Brad Tarr at (904) 232-3582.

Sincerely,

James C. Duck
Chief, Planning Division

Cc:
Tarr/CESAJ-PD-ES
Carter/CESAJ-PD-ES
Charles/CESAJ-CO-SO
Estock/CESAJ-CO-SO
Kurzbach/CESAJ-PD-ES
Smith/CESAJ-PD-E
Brooks-Hall/CESAJ-DP-I
Duck/CESAJ-PD

Planning Division
Environmental Branch

OCT 30 2000

Mr. James J. Slack
Field Supervisor
U S Fish and Wildlife Service
Post Office Box 2676
Vero Beach, Florida 32961-2676

Re: Herbert Hoover Dike (Reach One)
Supplement draft FWCA report

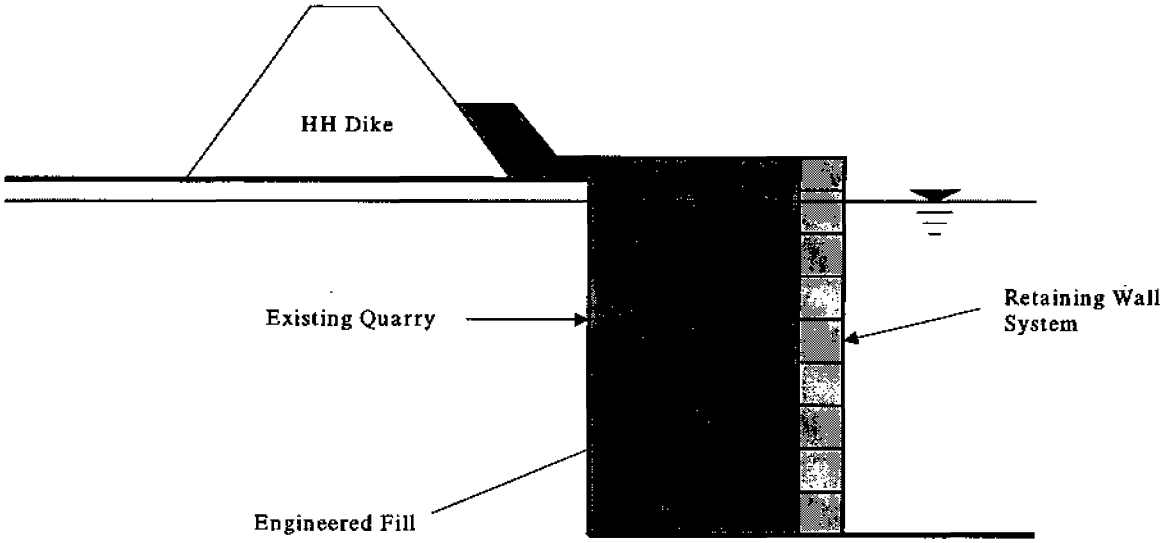
Dear Mr. Slack:

This is in response to your letter dated February 11, 2000, which contained the supplement to the draft Fish and Wildlife Coordination Act (DFWCA) report for Reach 1 of the Herbert Hoover Dike Major Rehabilitation Project.

The U.S. Army Corps of Engineers (Corps) has reviewed your evaluation on potential cumulative impacts to wetlands along the toe of the Herbert Hoover Dike. Although the project is expected to result in a permanent loss of wetland usage, the affected habitat is a direct result of seepage through the dike, the correction of which is the main purpose of the proposed construction. Since the created habitat is not natural, and major renovations are critical to the integrity of dike in order to insure public safety, the Corps is not seeking mitigation alternatives for these actions. The Corps is, however, prepared to offer a strategy that would adequately compensate for any loss of associated wetland functions.

Regarding the Service's proposed compensatory mitigation plan, we cannot support or implement the plan as presented. It is important to emphasize the Corps has no authority in negotiating the acquisition of private property for the conversion of uplands to functional wetlands as recommended in Compensation Sites 1, 2 and 3. Furthermore, creating a littoral shelf along the existing quarries as proposed for Compensation Sites 4, 5, and 6 is unacceptable from an engineering standpoint. The purpose of the project is to stop the migration of material along and through the limestone layer beneath the embankment. In the quarry area,

the excavation pit itself compounds the problem. To remediate this area, the engineered filter requires a retaining wall system to hold it in place (see figure below). If the proposed mitigation system were constructed, it would allow water to routinely flow over and behind the retaining wall and allow vegetation to grow in the filter material. Vegetation in and around the structure can cause physical damage to the wall and backfill, undermine the wall system, and create a high potential for structural instability and failure of the designed remediation. Additionally, the promotion of vegetative growth would impede inspection and maintenance of the structure, which could cause long-term stability and structural problems.



Relative to the existing Herbert Hoover Dike, the Corps initiated an Exotic Plant Removal/Treatment program in 1999 and thus far, the effort has resulted in the following plant control measures:

1. Approximately 5 acres of *Melaleuca* were treated from Paul Rardin Park to Airport Hole.
2. Approximately 6 miles of Brazilian pepper were removed from S-4 to C-1A.
3. Approximately 110 acres of *Melaleuca* monoculture were treated from Fisheating Creek (L-50) to Indian Prairie Canal.

4. Approximately 10 acres of outlier trees including *Melaleuca* and Brazilian pepper were treated from Fisheating Creek (L-50) to Harney Pond Canal.
5. Approximately 35 acres of Australian pine, Brazilian pepper and *Melaleuca* trees were treated from C-5 to C-5A.
6. Approximately 50 acres of Australian pine, Brazilian pepper and *Melaleuca* trees were treated from Moore Haven to C-5A.
7. Approximately 65 acres of Brazilian pepper monoculture were treated on Indian Prairie Canal.
8. Approximately 6 miles of Brazilian pepper and Australian pine were removed from C-10 to Canal Point (S-352).

In addition, seven thousand trees consisting of bald cypress, pond apple and red maple, were planted on tree islands across from S-310, along mile marker 98-100, Airport Hole, and Yankee Point. Presently, a contractor is working to remove 2.5 miles of Australian pine from C1 to C-1A (see enclosure). To continue this operation for the year 2001, the Corps has developed a plan that would:

Conduct a re-treatment from Fisheating Creek to Indian Prairie Canal on *Melaleuca* monocultures (110 acres);

1) Treat outlier trees including *Melaleuca* and Brazilian pepper from Harney Pond Canal to Indian Prairie Canal;
2) Conduct a follow-up treatment on Brazilian pepper on Indian Prairie Canal;
3) Treat approximately 2 miles (estimate 15 acres) of *Melaleuca*, Brazilian pepper, and Australian pine from South Bay to House Boat Cut;
4) Remove exotic vegetation from the Kissimmee River to Taylor Creek (S-193) (estimate 50 acres);
5) Remove approximately 20 acres of Brazilian pepper trees on the south side of the Indian Prairie Canal;
6) Remove 10 miles of Brazilian pepper from Port Mayaca (S-308) to Chancy Bay (S-135); and
7) Plant approximately 64 15-gallon red maple trees, 250 wax myrtle trees and 250 salt bush trees along Indian Prairie Canal.

The Corps intends to support the Exotic Plant Removal/Treatment program along the Herbert Hoover Dike and the perimeter of Lake Okeechobee and will investigate opportunities to enhance existing wetland functions by increasing the rates of plant survival through additional monitoring, irrigation, or other adequate hydrological methods. We intend to work closely with your staff to develop a master mitigation plan for the entire HHD system that will satisfy all renovation requirements while allowing for the enhancement and restoration of natural environments in the project area.

The Corps appreciates the continued cooperation with the Service, and is seeking mutual resolution through a Final Fish and Wildlife Coordination Act (FFWCA) report for the referenced project. Please contact Mr. Brad Tarr at 904-232-3582 or Mr. Olice Carter at 904-232-1140 if you have any additional questions.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

Copy Furnished:

Mr. Robert Pace, U.S. Fish and Wildlife Service, Post Office Box 2676, Vero Beach, Florida 32961-2676

Ms. Mary Ann Poole, Florida Fish and Wildlife Conservation Commission, 255 154th Avenue, Vero Beach, Florida 32968-9041

bcc:
CESAJ-PD-ES (Kurzbach)
CESAJ-CO-SO (Charles)
CESAJ-EN-GS (Burch)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
P.O. Box 2676
Vero Beach, Florida 32961-2676

February 11, 2000

Colonel Joe R. Miller
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attention: Planning Division

Re: Herbert Hoover Dike
Major Rehabilitation Report
(Reach One)

Dear Colonel Miller:

We are pleased to provide the enclosed supplement to the draft Fish and Wildlife Coordination Act (FWCA) report for the Herbert Hoover Major Rehabilitation Report. This supplement is provided in accordance with the FWCA of 1958 (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) and section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

This supplemental report provides the results of a wetland functional assessment associated with this 22-mile long project, and outlines a compensatory wetland mitigation plan to be included in the Final Environmental Impact Statement (EIS). This supplement does not satisfy the requirements of Section 2 (b) of the FWCA.

The Fish and Wildlife Service (Service) recommends that the Army Corps of Engineers (Corps) respond to this supplement and solicit a Final FWCA report prior to issuing a Final EIS for this project. We also recommend that the Corps review the Department of the Interior's comments on the Draft EIS to assist you in modifying statements relative to the value of wetlands to be affected by the project in accordance with the findings of this supplement. Lastly, the Service recommends that the Corps include a commitment in the Final EIS to investigate in greater detail the Service's proposed compensatory mitigation plan during the Plan Formulation phase, and carrying through Plans and Specifications.

The Service wishes to thank the following Corps' employees for their assistance in evaluating the wetland functions to be affected by the project: Mark Ziminske (formerly Jacksonville), Angie Charles (Clewiston), Pete Grace (Jacksonville), and Olice Carter (Jacksonville). We greatly appreciate your cooperation in this planning effort. If you have any additional questions, please contact Mr. Robert Pace at (561) 778-0896, extension 11.

Sincerely yours,

James J. Slack
Field Supervisor

Enclosure

cc:
Bradley Hartman, FWC, Tallahassee, Florida
Mary Ann Poole, FWC, Vero Beach, Florida
Angie Charles, Corps, Clewiston, Florida
Pete Grace, CESAJ-EN, Corps, Jacksonville, Florida

Enclosure

SUPPLEMENT TO

THE DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

ON THE

HERBERT HOOVER DIKE
MAJOR REHABILITATION REPORT
(REACH ONE)

Prepared by:
Robert T. Pace
U.S. Fish and Wildlife Service
South Florida Ecological Services Office
Vero Beach, Florida

Approved by:
David L. Ferrell
U.S. Fish and Wildlife Service
South Florida Ecological Services Office
Vero Beach, Florida

February 2000

I. INTRODUCTION

In October 1998, the Fish and Wildlife Service (Service) submitted a Draft Fish and Wildlife Coordination Act (FWCA) report for Reach 1 of the Herbert Hoover Dike (HHD) Major Rehabilitation Project. The FWCA report found that either Alternative 2 or Alternative 3 would be acceptable, provided that:

1. compensatory wetland mitigation will be provided for unavoidable losses of wetlands;

2. control of exotic vegetation will be carried out in perpetuity in the compensatory wetlands;

3. construction will be scheduled to avoid activity within 1,500 feet of any active bald eagle nest during the nesting season;

4. standard protective measures will be carried out to avoid wounding or killing Eastern indigo snakes; and

5. if burrowing owls are found to be present in the project area, impacts will be minimized by altering construction schedules to avoid the nesting season and/or burrows will be cordoned off to avoid their direct destruction.

The Corps of Engineers (Corps) issued a Draft Environmental Impact Statement (DEIS) for the project in July 1999. The DEIS did not include any measures to compensate for unavoidable impacts to wetlands along the toe of the HHD. The Department of the Interior (Department) commented on the DEIS in September 1999. The Department disagreed with several statements in the DEIS where the Corps did not recognize any significant impacts of the project on wetlands, and recommended that the Final Environmental Impact Statement (EIS) include compensatory mitigation for wetland losses.

The DEIS stated that a drainage swale proposed to be constructed beyond the new toe of fill after construction of the project would adequately compensate for wetland losses. The Service disagrees with this claim on the following grounds:

1. The Corps did not perform an evaluation of the existing wetlands prior to publication of the DEIS. This supplement to the Draft FWCA report supports the Department's position that the cumulative value of the wetlands to be impacted along the nearly 22 miles of Reach 1 is substantial.

2. The schematic drawing for the Corps' preferred Alternative 3 shows the proposed swale to be one to two feet deep relative to the surrounding upland grade. The Service finds that such a swale is likely to contain water only for brief periods following heavy rains, but would most likely not even meet the hydrology requirement for a regulatory

wetland in most places along the HHD, let alone serve as a high quality wetland to compensate for the losses attributable to this project. As evidence for the Service's position, please refer to Figure 1, which is a photograph of an existing roadside swale of similar or greater proportions in the vicinity of the HHD. Please note that this swale is normally dry, could not be classified as a wetland, and would have minimal habitat value for fish or wildlife.

3. In 1996, a pilot project similar to the Corps' preferred Alternative 3 was constructed just north of Culvert 10. The Service notes that the project is operating as intended without a swale in the location suggested by the schematic drawing of Alternative 3. The Corps may determine that the proposed swale is or is not necessary in certain portions of the project, but this should not be based on the need to compensate for wetland losses. The Service recommends that efforts to compensate for wetland losses be consolidated into a few adequately sized sites that can be maintained as high quality wetlands.

This supplement to the Draft FWCA report provides an evaluation of the wetland functions and values to be impacted by the project and more specific recommendations for compensatory mitigation than in our Draft FWCA report.

II. METHODS FOR FIELD INSPECTIONS AND DESKTOP CALCULATIONS

The Service has evaluated wetland functions and values to be affected by the project in accordance with the Wetland Rapid Assessment Procedure (WRAP) (Miller and Gunsalus 1997). The linear wetlands along the toe of the HHD are not readily identifiable at the map scale used by the National Wetlands Inventory or the landuse coverages available from the South Florida Water Management District (SFWMD). The Service made a preliminary selection of potential WRAP polygons from inspection of 3-meter resolution Digital Orthophoto Quarter Quads (DOQQs) (1996 images). Based on 1998 field inspections prior to issuance of the Draft FWCA report, and based on interpretation of the DOQQ images, the wetlands at the northern end of Reach 1 (just south of Port Mayaca) were known to be more diverse and of higher quality than in the southern portion of the project, where wetland values were reduced and quite similar for greater distances along the HHD. On this basis, the Service decided to begin the WRAP evaluations at the northern end of the project, where evaluation points needed to be more closely spaced.

Sites for WRAP evaluations were selected from these initial locations during the field inspection on November 3, 1999. Figures 2A, 2B, and 2C show the points for the existing condition WRAP evaluations. These values at these sites were extended to polygons of appropriate length along the HHD, according to places where transitions in environmental conditions occur. The WRAP team was composed of the following members: Mark Ziminske, Corps, Jacksonville; Angie Charles, Corps, Clewiston; Tim Towles, Florida Fish and Wildlife Conservation Commission,

Vero Beach; David Ferrell, Service, Vero Beach; and Robert Pace, Service, Vero Beach. In addition to observation of emergent vegetation and birds, dip netting at each site assisted in estimating the value of each wetland as habitat for fish and aquatic invertebrates.

A second field inspection was conducted on January 19, 2000. Its purpose was not to further evaluate existing wetland functions, but to establish the following: (1) a more informed estimation of the location and extent of project impacts as interpreted by the Project Engineer, Pete Grace; (2) confirmation of points along the project where WRAP polygons begin and end (transition in habitat conditions); (3) greater focus on identifying potential sites for creation of compensatory wetlands; and (4) orientation of the new Corps' biologist, Olice Carter, to outstanding environmental issues for the project. The second field inspection included Mr. Grace, Mr. Carter, Ms. Charles, and Mr. Pace. Locations of observations were measured as miles south of the southern end of Port Mayaca.

Based on current plans (prior to detailed design), Mr. Grace advised the Service to evaluate impacts based on deposit of fill on average 30 feet beyond the current toe of the HHD. This would completely eliminate any canal or ditch present along the toe and, in some portions of the project, would also impact a narrow strip of wetlands beyond the canal or ditch.

Area measurements for WRAP polygons (both existing conditions and the proposed compensatory mitigation sites) were calculated by multiplying widths of features observed in the field by length measurements using Arcview software, based on the DOQQs and other digitized data sets, particularly landuse, and hydrography.

III. RESULTS FOR EXISTING CONDITIONS

The WRAP scores support the observation that wetland function generally declines from north to south along Reach 1. The wetland evaluation summary sheets for each of the evaluation sites are included as Appendix A to this report. In the north, a wide and deep canal runs along the toe of the HHD. This provides nearly permanent aquatic habitat for organisms, supporting not only small forage fishes but large predatory fishes, alligators, and turtles. The northern canal is also well buffered from disturbance, with forested wetlands to the east and no adjacent urban or agricultural lands. Water quality in the northern portions of Reach 1 was considered to be good. The willow-dominated (*Salix caroliniana*) community at the northern end of Reach 1 was evaluated as having the highest functional index (.75) in the project. Other wetlands in the northern portions were dominated by the exotic Brazilian pepper (*Schinus terebinthifolius*), and were given a lower index of .58. Proceeding south towards Pahokee, the canal adjacent to the toe of the HHD became generally narrower; its water quality was considered to be adversely affected by dense coverage of floating vegetation, particularly the exotic water hyacinth (*Eichhornia crassipes*). The proximity of a railroad eliminated the buffer to the east and also reduced the water quality scores. Adjacent to the urban portions of Pahokee, little or no wetlands were found along the narrower ditch at the base of the HHD, buffers were absent to the east, and water quality was reduced. The lowest functional value was assigned to a lengthy portion in the southern end of Reach 1 where a narrower and shallower ditch followed the base of the HHD,

with adjacent sugarcane. Although this ditch supported growth of periphyton and contained small fish that could be consumed by wading birds, the diversity of aquatic animals it could support was considered to be reduced by the fact that it was likely to dry completely in times of drought. This would make it less suitable for larger predatory fishes, alligators, and some species of turtles.

Table 1 calculates the functional units (WRAP score multiplied by acreage) for the existing wetlands to be eliminated by deposit of fill along the toe of the HHD.

IV. RESULTS FOR PROPOSED FUTURE WITH PROJECT CONDITION, WHICH INCLUDES COMPENSATORY WETLANDS

In evaluating sites and methods for possible creation of compensatory wetlands, the following were not considered suitable:

1. exotic control, dredging, or otherwise altering any vegetated wetlands that might remain adjacent to the toe of the fill after construction (but the open waters of the quarry were considered as suitable for enhancement);

2. commercial or residential properties;

3. the Palm Beach County Glades Airport property;

4. areas supporting tree crops (bananas, mangoes); or

5. areas that are part of large expanses of sugarcane.

With the exception of creating vegetated shelves along the quarry, the Service concluded that conversion of presently upland areas would provide the greatest "lift" in wetland habitat function. We have identified sites that provide adequate space for creation of wetlands, but are not part of a continuous expanse of agricultural land. The sites are narrow strips of land that, following construction of the proposed project, would be of limited value for agricultural, residential, or commercial development. In two cases (Compensation Sites 2 and 3) these are narrow strips of remnant pasture between the HHD and U.S. Highway 441. Compensation Site 1 is a small sugarcane field that is isolated by U.S. Highway 441 from the larger plantations to the east. Compensation Site 5 involves excavation of an approximately 30-foot wide shelf from existing uplands along the quarry. Figures 3A through 3C provide more detailed views of the location of proposed compensatory wetlands than in Figures 2A through 2C. Figure 4 is a photograph of the existing upland area beyond where the proposed culvert will be buried that could be excavated to appropriate elevations for establishment of wetlands. Figure 5 is a schematic cross-section of the same area with the proposed compensatory wetlands in place. Compensation Sites 4 and 6 would entail additional deposit of fill beyond that required to bury the Corps' proposed culvert to form a vegetated shelf along the quarry (Figure 6). Because the open water of the quarry has

existing value as an aquatic habitat, the "lift" realized is less than creating a wetland from an upland.

Detailed mitigation planning would be required during Plan Formulation, including surveys to determine elevation/hydroperiod relationships, detailed contouring, soil preparation, and planting plans. Presently, the Service offers the following general design recommendations for the compensatory wetlands:

1. Irregularly-shaped deeper pools that will remain flooded through drought years (possibly 4 to 6 feet below surrounding upland grade) should be placed within the compensatory wetlands to serve as drought refugia for fish and aquatic invertebrates.

2. The elevation of the wetlands surrounding the drought refugia should be suitable for planting of semi-permanently or seasonally flooded native woody species, such as pond apple (*Annona glabra*), red maple (*Acer rubrum*), and Carolina willow (*Salix caroliniana*). Density and survival criteria should be set for planted species through at least five years after planting, and replanting would be necessary if the initial planting does not meet the criteria.

3. The compensatory wetlands will be maintained free of invasive exotics in perpetuity.

Using the above assumptions, the Service has projected a functional value for the compensatory wetlands of .8, which is higher than any of the wetlands which the project will impact. In the areas where the wetlands would be established in the existing open water of the quarry, the Service has attempted to provide maximum credit for functional "lift" by assuming that the existing value is the lowest we observed in our WRAP evaluation (.32), and that the compensatory wetlands reach a value of .8, for a functional "lift" of .48.

Table 2 provides a summary of the projected functional units for the proposed compensatory wetlands, which is nearly equivalent to the functional units to be lost in construction of the project.

V. SUMMARY OF RECOMMENDATIONS

The Service recommends that the Corps respond to this supplement and solicit a Final FWCA report prior to issuing a Final EIS for this project. The Corps should reference the findings of this report in appropriate sections of the Final EIS to address the Department's comments on the Draft EIS. The Final EIS should include a commitment by the Corps to further coordinate with the Service in development of a detailed mitigation plan prior to and during the Plan Formulation phase, and carrying through Plans and Specifications.

The Service's recommendations from the draft FWCA report regarding measures to protect the bald eagle, the Eastern indigo snake, and the burrowing owl remain in effect. Our field inspections indicated the consistent presence of a bald eagle along the HHD between Canal Point

and Pahokee at about Mile 10 measuring from south of Port Mayaca. The Corps must search the area for bald eagle nests prior to construction to avoid construction activities that might disrupt nesting.

VI. LITERATURE CITED

Miller, R.E., Jr., and B.E. Gunsalus. 1997 (Updated August 1999). Wetland Rapid Assessment Procedure (WRAP). Technical Publication REG-001. South Florida Water Management District; West Palm Beach, Florida.

Table 1. Existing wetland functions to be lost through construction of Reach 1 of the Herbert Hoover Dike rehabilitation project.

Polygon Number	Evaluation Location[1]	Descriptor[2]	WRAP Score	Length (Feet)	Width (Feet)	Area (Acres)	Functional Units
1	0.2	willow	0.75	1,313	10	0.30	0.23
2	0.5	canal	0.62	4,320	20	1.98	1.23
3	0.5	*Schinus*	0.58	2,992	10	0.69	0.40
4	1.2	canal	0.57	4,970	15	1.71	0.98
5	1.7	*Schinus*	0.58	970	15	0.33	0.19
6	2.1	marsh/shrub	0.67	3,896	10	0.89	0.60
7	2.1	canal	0.55	9,358	20	4.30	2.36
8	3.5	canal	0.65	3,425	20	1.57	1.02
9	3.5	marsh	0.55	5,624	10	1.29	0.71
10	5.0	canal	0.57	6,463	15	2.23	1.27
11	6.0	ditch	0.53	14,652	10	3.36	1.78
12	8.4	canal	0.65	18,483	15	6.37	4.14
13	12.9	ditch, urban area	0.47	14,327	12	3.95	1.86
14	15.1	ditch at airport	0.57	8,022	8	1.47	0.84
15[3]	19.0	ditch, beside sugarcane	0.32	22,113	8	4.06	1.30
				Total Functional Units			**18.90**

[1]Expressed as miles south of Port Mayaca; see map.

[2]We have used the term "canal" for water conveyances 15 feet or greater in width, while narrower (and generally shallower) conveyances are termed "ditches."

[3]Excludes roadside swale (from approx. mile 16.7 to mile 18.0), which was determined not to meet the definition of a regulatory wetland.

Table 2. Potential functional units for compensatory wetlands that could be created along Reach 1 of the Herbert Hoover Dike rehabilitation project.

Potential Compensatory Site Number[4]	Approx. Location[5]	Method	Projected WRAP "lift"	Length (Feet)	Width (Feet)	Area (Acres)	Functional Units
1	0.8 to 1.3	Excavate	0.8	2,700	180	11.16	8.93
2	1.8 to 2.0	Excavate	0.8	1,000	150	3.44	2.76
3	4.5 to 4.8	Excavate	0.8	1,550	200	7.12	5.69
4	15.0 to 15.2	Fill	0.48	1,025	30	0.71	0.34
5	15.2 to 15.6	Excavate	0.8	1,780	30	1.23	0.98
6	15.7	Fill	0.48	400	30	0.28	0.13
				Total Functional Units			**18.83**

TVA = 23.9
DL

[4]See maps.

[5]Expressed as miles south of Port Mayaca; see maps.

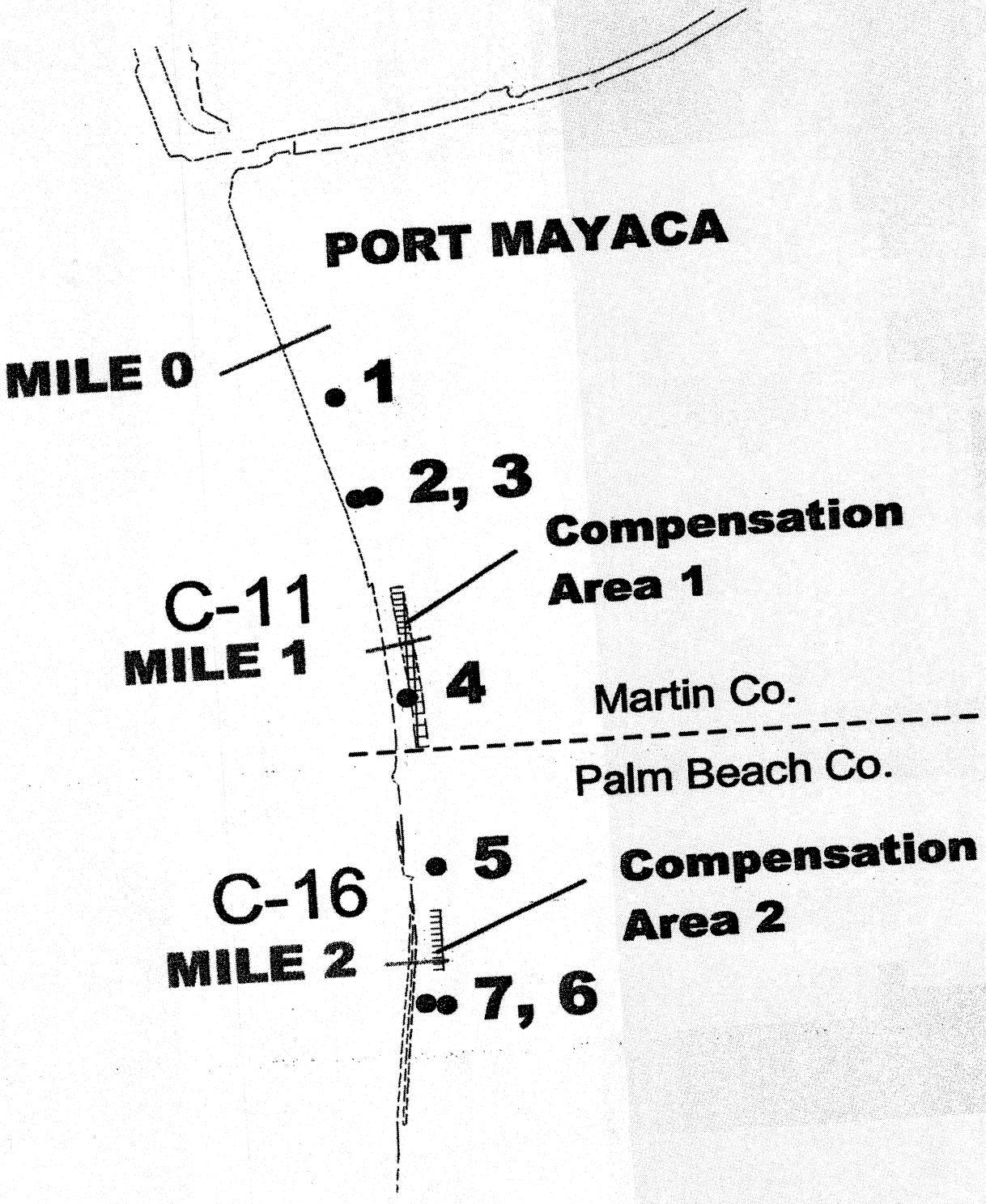


Figure 2A. Location of WRAP evaluation sites and proposed compensatory wetlands just south of Port Mayaca.

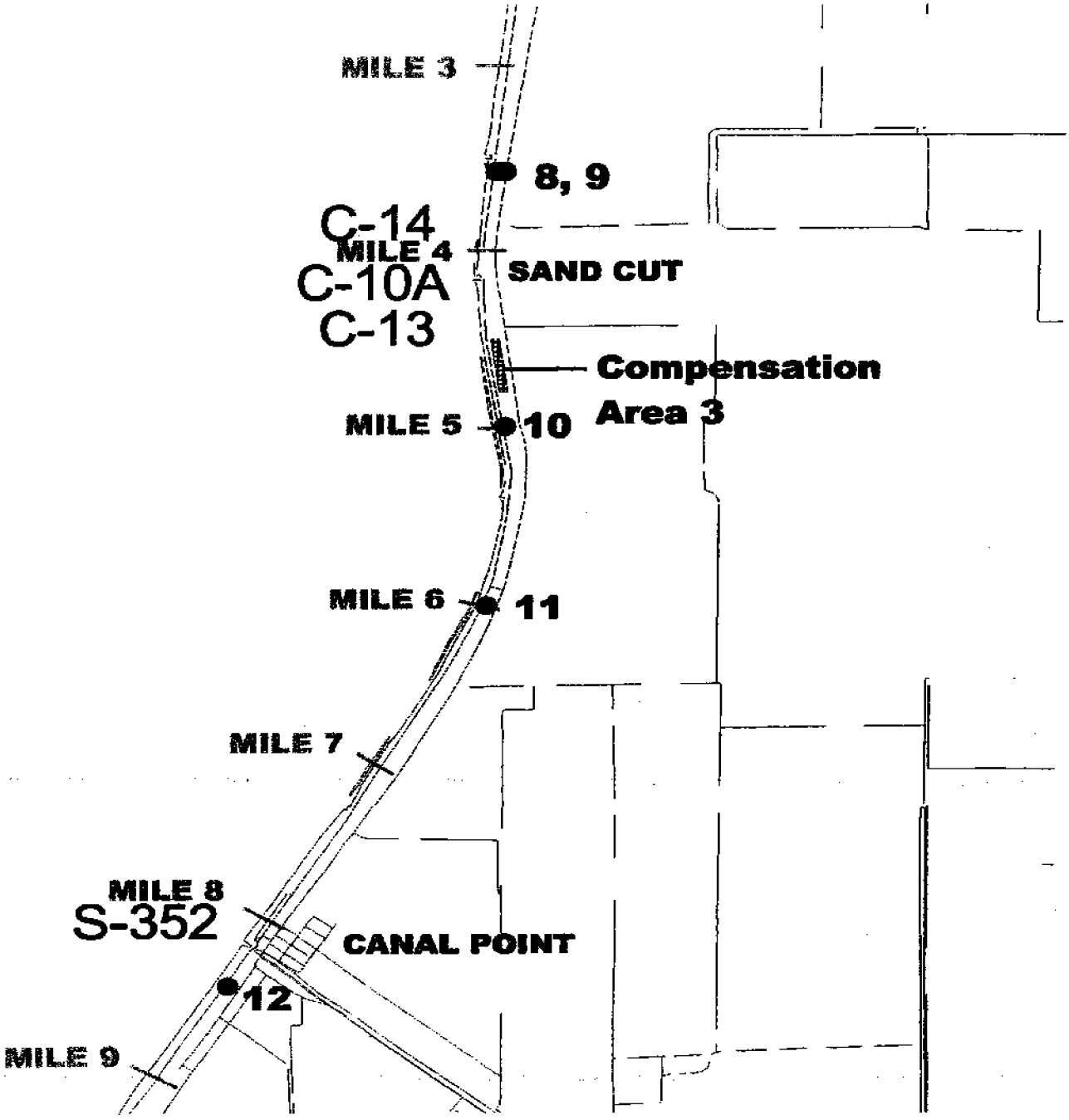


Figure 2B. Location of WRAP evaluation sites and proposed compensatory wetlands near Sand Cut and Canal Point.

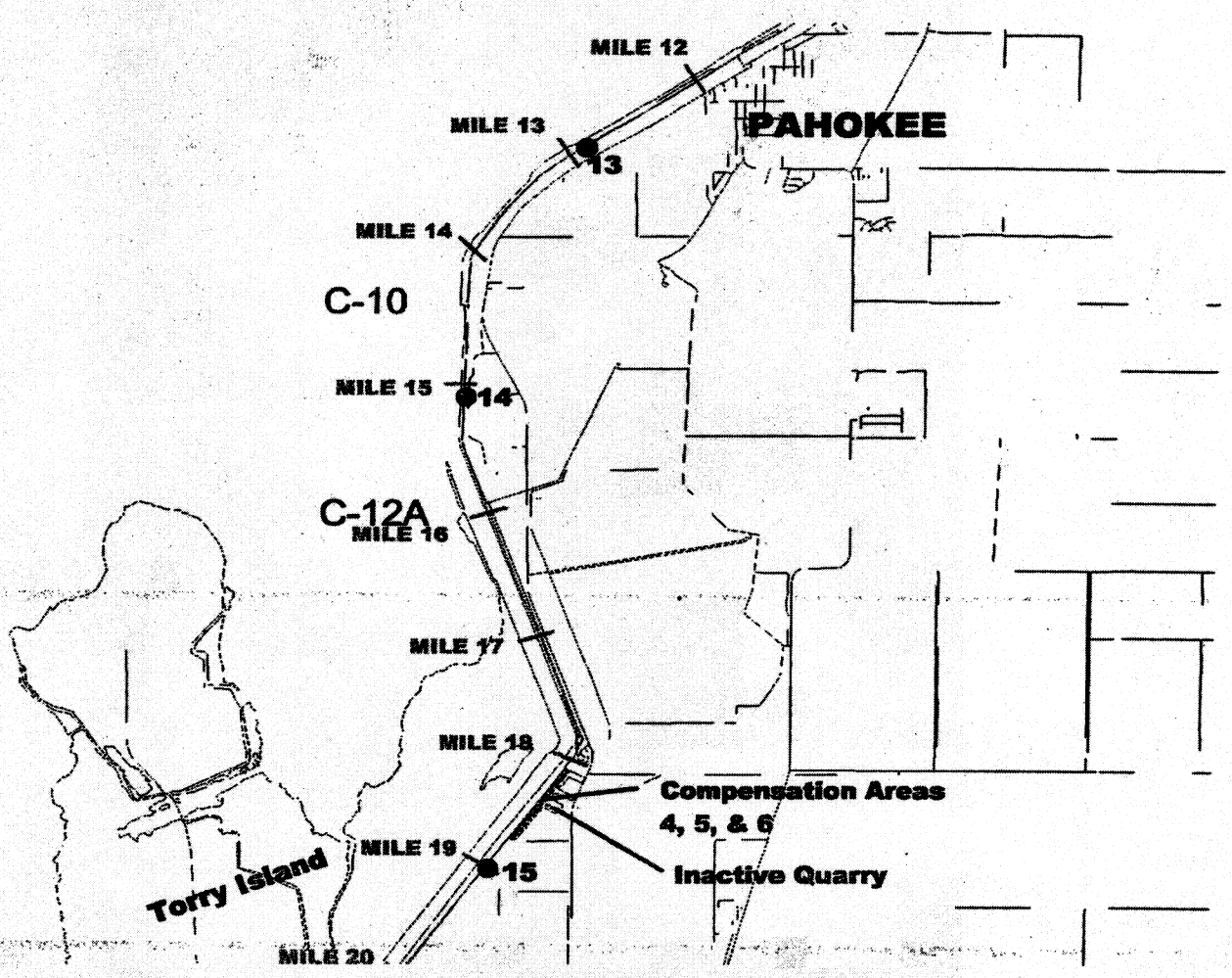


Figure 2C. Location of WRAP evaluation sites and proposed compensatory wetlands from Pahokee to Torry Island.

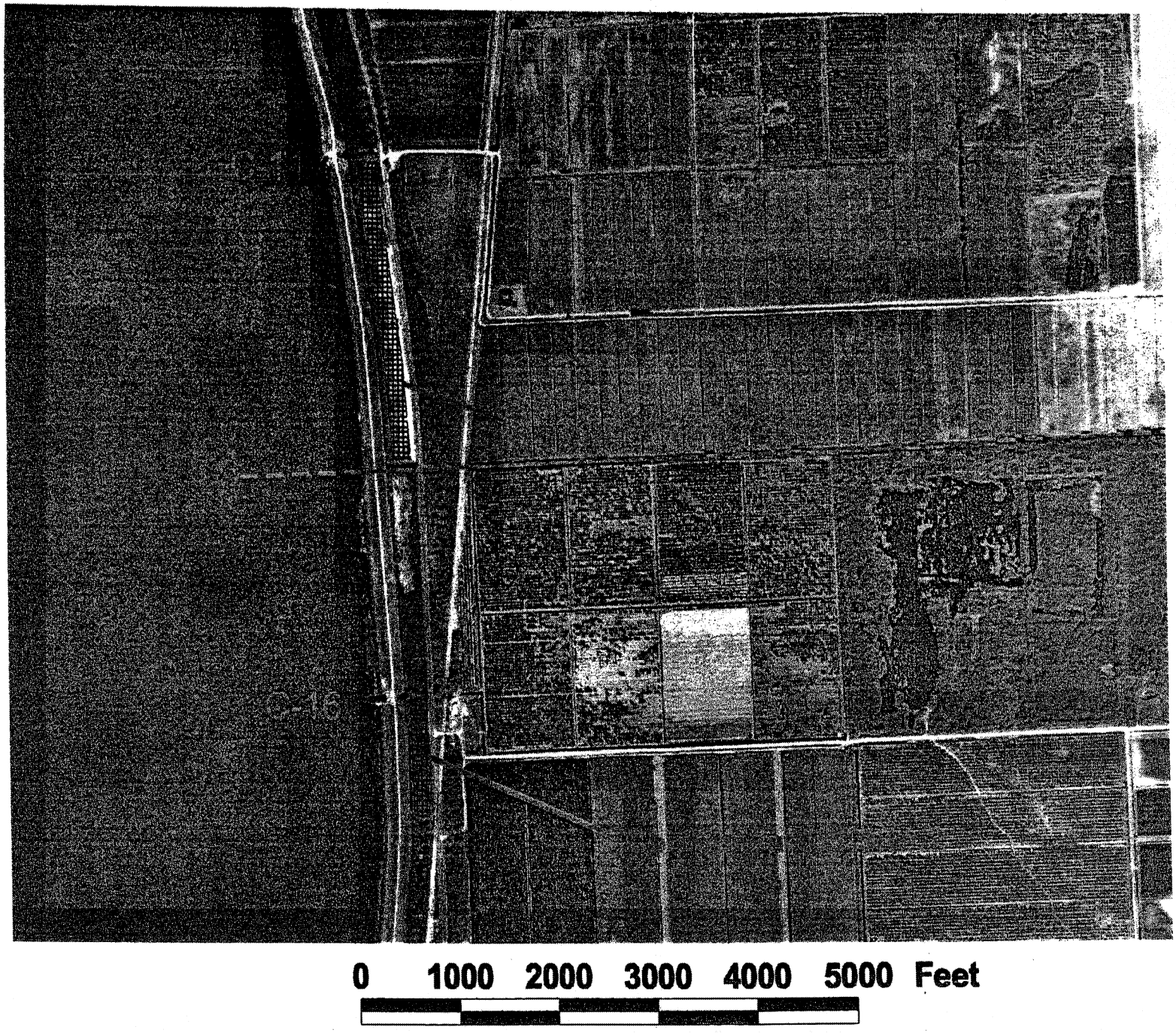


Figure 3A. More detailed location of proposed Compensatory Sites 1 and 2.

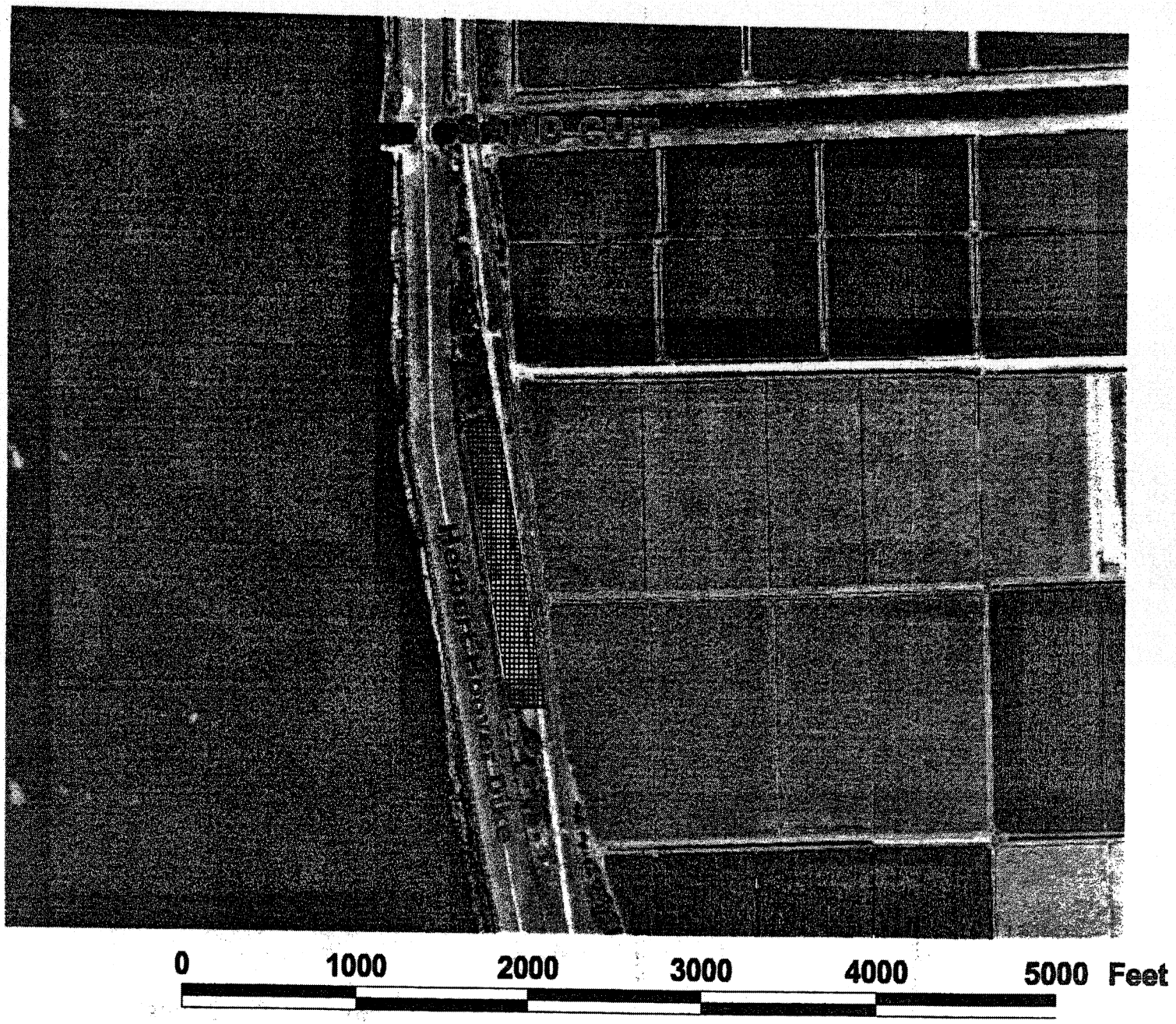


Figure 3B. More detailed location of proposed Compensatory Site 3.

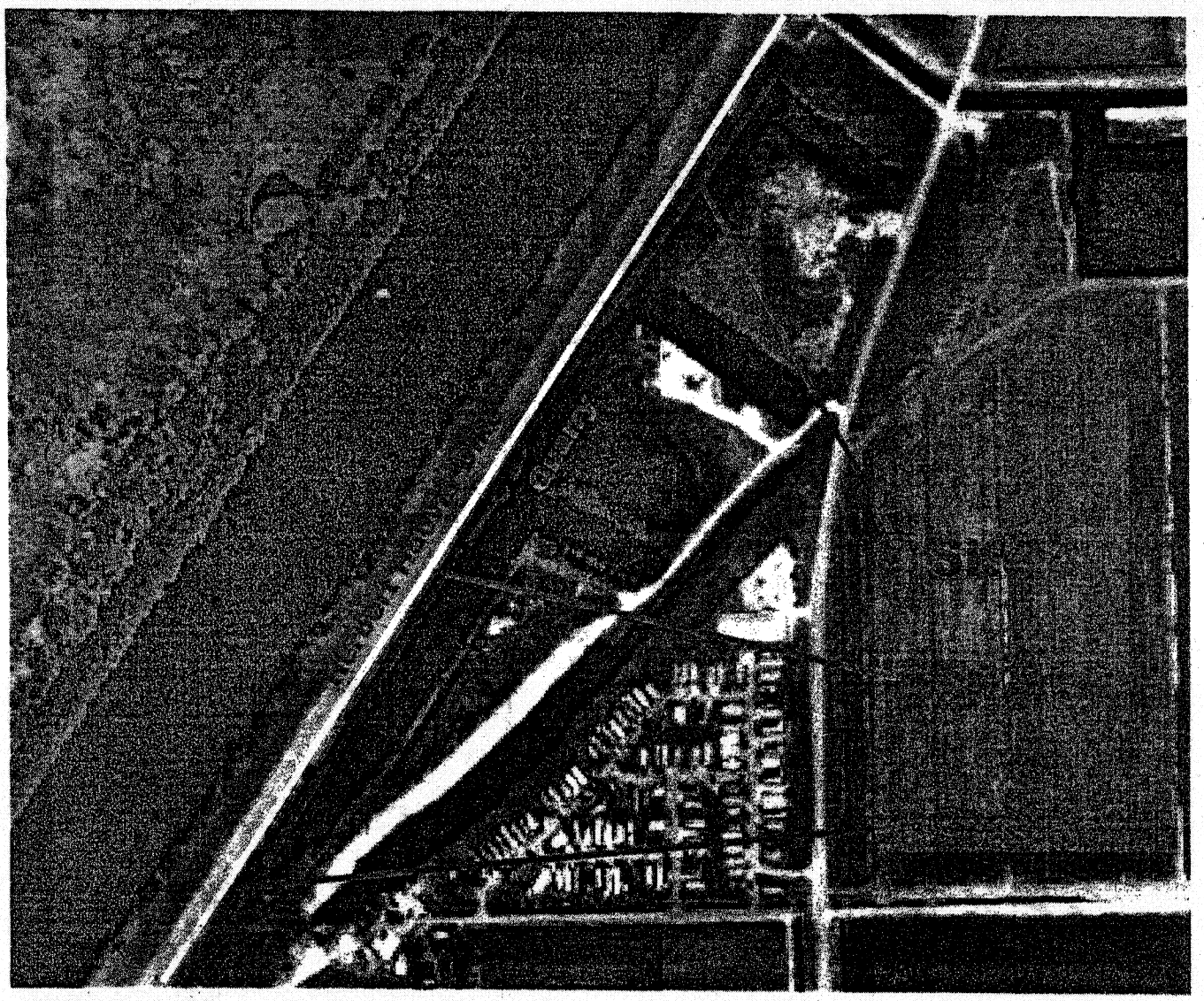


Figure 3C. More detailed location of proposed Compensatory Sites 4, 5, and 6 along inactive quarry.

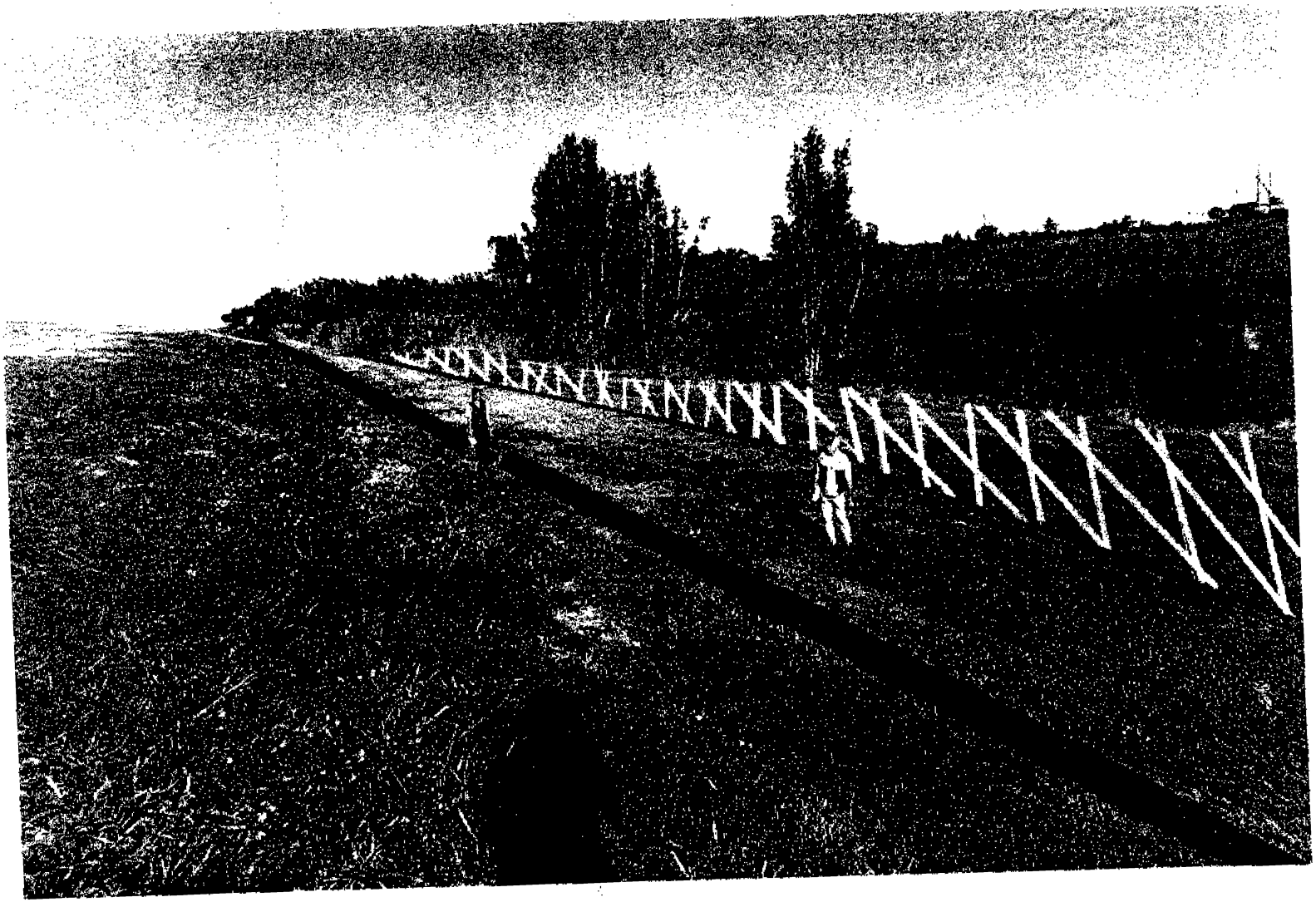


Figure 4. Photograph of existing conditions at proposed Mitigation Site 5. Black line indicates probable location for the Corps' proposed culvert. Red line indicates approximate new toe of fill that will cover culvert (~30 ft. beyond culvert). Yellow area will be available for shallow excavation to create wetlands (additional ~30 ft.-wide shelf).

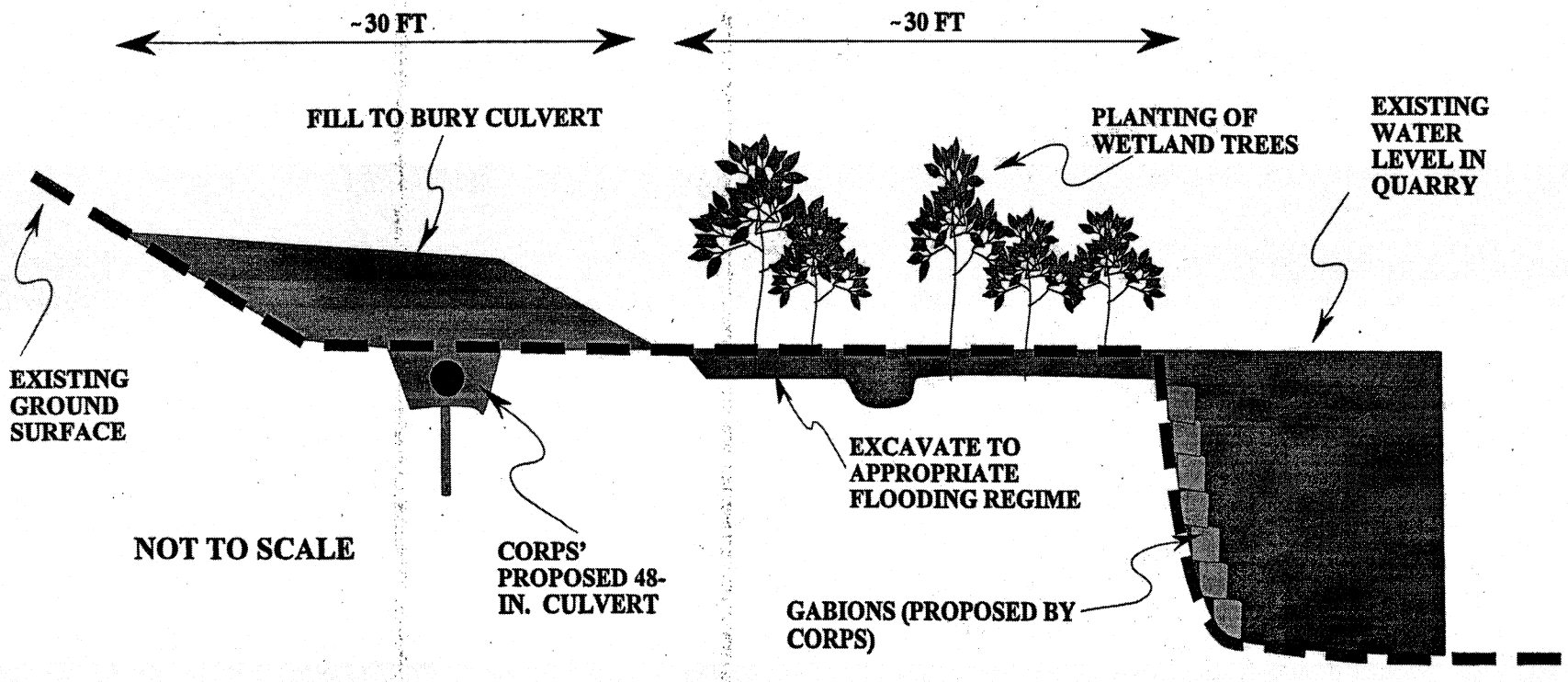


Figure 5. Schematic cross-section of proposed excavation of wetland shelf at Compensation Area 5. (See also Figure 4.)

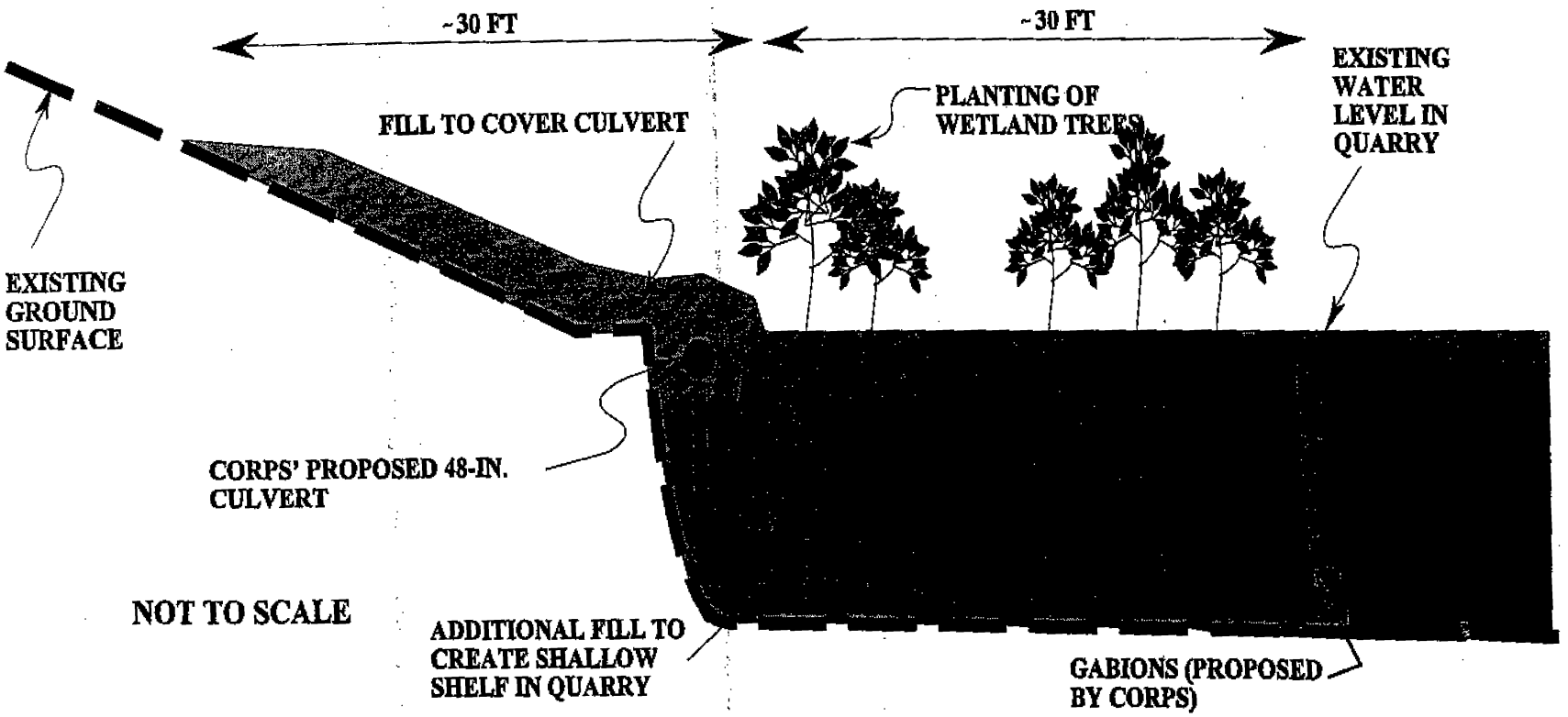


Figure 6. Schematic cross-section of proposed filling to create wetland shelf at Compensation Areas 4 and 6.

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 1 – Willow at mile 0.2 **SUMMARY SCORE: 0.75**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
2.50 Fish and Wildlife Utilization:	Small/medium mammals (including otter), fish, invertebrates
2.00 Overstory/Shrub Canopy:	Predominately Ficus, Roystonea, Lemna, Ludwigia, Centella, Commelina (on bank)
N/A Vegetative Ground Cover:	
2.00 Upland/Wetland Buffer:	> 30 ft. and < 300 ft., >75% exotics
2.00 Field Indicators of Wetland Hydrology:	
2.75 Water Quality Inputs and Treatment: $\frac{LU+PT}{2}$	

Land Use: 2.75 Pre-treatment 2.75

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 2 – Canal at mile 0.5. **SUMMARY SCORE: 0.62**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
2.00 Fish and Wildlife Utilization:	Great blue heron, killdeer, largemouth bass, sunfishes, various killifishes, mosquitofish, snipe, alligator, mud turtle, snakes, bullfrog, amphiuma, grass shrimp, water beetles
N/A Overstory/Shrub Canopy:	
1.50 Vegetative Ground Cover:	Alternanthera philoxeroides, Pistia stratiotes, Commelina, Lemna, Ludwigia, Centella
1.00 Upland/Wetland Buffer:	> 75% exotics, >300 ft.
2.00 Field Indicators of Wetland Hydrology:	Canal > 4 ft. deep; does not dry down.
2.75 Water Quality Inputs and Treatment: $\frac{LU+PT}{2}$	

Land Use: 2.75 Pre-treatment 2.75

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 3 – Schinus at mile 0.5 **SUMMARY SCORE: 0.58**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE		NOTES
1.50	Fish and Wildlife Utilization:	Amphibians, reptiles, forage fish
0.50	Overstory/Shrub Canopy:	Predominately Schinus, some Casuarina and Ficus
N/A	Vegetative Ground Cover:	
2.00	Upland/Wetland Buffer:	> 30 ft. and < 300 ft., >75% exotics
2.00	Field Indicators of Wetland Hydrology:	
2.75	Water Quality Inputs and Treatment: $\frac{LU+PT}{2}$	Land Use: 2.75 Pre-treatment 2.75

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 4 – Canal at mile 1.2 **SUMMARY SCORE: 0.57**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE		NOTES
2.00	Fish and Wildlife Utilization:	See Polygon 2
N/A	Overstory/Shrub Canopy:	
1.50	Vegetative Ground Cover:	See Polygon 2
0.75	Upland/Wetland Buffer:	Score reduce because only 25 ft. of Schinus, which is backed by sugarcane.
2.00	Field Indicators of Wetland Hydrology:	
2.25	Water Quality Inputs and Treatment: $\frac{LU+PT}{2}$	Land Use: 2.25 Pre-treatment 2.25

Proximity of sugarcane reduces score.

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 5 – Schinus at mile 1.7 **SUMMARY SCORE: 0.58**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
1.50	Fish and Wildlife Utilization:
Same as Polygon 3	
0.50	Overstory/Shrub Canopy:
Same as Polygon 3	
N/A	Vegetative Ground Cover:
2.00	Upland/Wetland Buffer:
> 30 ft. and < 300 ft., >75% exotics	
2.00	Field Indicators of Wetland Hydrology:
2.75	Water Quality Inputs and Treatment: $= \frac{LU+PT}{2}$
	Land Use: 2.75 Pre-treatment 2.75

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 6 – Wetland at mile 2.1 (BETWEEN RAILROAD AND CANAL) **SUMMARY SCORE: 0.67**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
1.50	Fish and Wildlife Utilization:
Yellow-throated warbler and palm warbler observed; probably good migratory bird habitat.	
2.00	Overstory/Shrub Canopy:
Willow dominant, some Schinus, Casuarina, and Phragmites.	
N/A	Vegetative Ground Cover:
2.00	Upland/Wetland Buffer:
2.00	Field Indicators of Wetland Hydrology:
2.50	Water Quality Inputs and Treatment: $= \frac{LU+PT}{2}$
	Land Use: 2.5 Pre-treatment 2.5
Score slightly reduced by presence of railroad.	

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 7 – Canal at mile 2.1; railroad nearby. **SUMMARY SCORE: 0.55**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
1.50	Fish and Wildlife Utilization:
	Similar to Polygon 2, but value reduced by complete coverage of water hyacinth.
N/A	Overstory/Shrub Canopy:
0.25	Vegetative Ground Cover:
	Reduced by total coverage by water hyacinth.
2.00	Upland/Wetland Buffer:
2.00	Field Indicators of Wetland Hydrology:
2.50	Water Quality Inputs and Treatment: $\frac{LU+PT}{2}$
	Land Use: 2.5 Pre-treatment 2.5

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 8 – Canal at mile 3.5 (South of C-14 culvert) **SUMMARY SCORE: 0.65**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
1.50	Fish and Wildlife Utilization:
	Forage fishes, some evidence of birds, but less valuable than Polygon 2
N/A	Overstory/Shrub Canopy:
1.50	Vegetative Ground Cover:
	Phragmites, Thalia, Colocasia, dense Lemna, Hydrocotyle, Polygonum
2.00	Upland/Wetland Buffer:
2.00	Field Indicators of Wetland Hydrology:
2.75	Water Quality Inputs and Treatment: $\frac{LU+PT}{2}$
	Land Use: 2.75 Pre-treatment 2.75

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 9 – Emergent wetland at mile 3.5 **SUMMARY SCORE:** **0.55**
(South of C-14 culvert)
Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Zimineke and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
1.50	Fish and Wildlife Utilization:
	Forage fishes, invertebrates, but less valuable than Polygon 2
N/A	Overstory/Shrub Canopy:
2.00	Vegetative Ground Cover:
	Typya, Thalia, *Colocasia*, willow, water hyacinth
1.50	Upland/Wetland Buffer:
2.00	Field Indicators of Wetland Hydrology:
1.25	Water Quality Inputs and Treatment: $\frac{LU+PT}{2}$
	Land Use: **1.25** Pre-treatment **1.25**
	Reduced by proximity of railroad.

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 10 – Canal at mile 5.0 **SUMMARY SCORE:** **0.57**
(North of C-13 culvert)
Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Zimineke and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
2.00	Fish and Wildlife Utilization:
	Great egret, snipe, palm warblers, alligator, turtles,forage fishes, invertebrates
N/A	Overstory/Shrub Canopy:
1.00	Vegetative Ground Cover:
	Pistia, Thalia, *Colocasia*, *Lemna*, *Polygonum*, water hyacinth, *Alternanthera*, *Typha*, *Panicum*
1.50	Upland/Wetland Buffer:
2.00	Field Indicators of Wetland Hydrology:
2.00	Water Quality Inputs and Treatment: $\frac{LU+PT}{2}$
	Land Use: **2** Pre-treatment **2**
	Adjacent cropline or improved pasture reduces buffer quality

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 11 – Ditch at mile 6.0 **SUMMARY SCORE: 0.53**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
2.00	Fish and Wildlife Utilization:
Forage fishes, aquatic insects, grackle	
N/A	Overstory/Shrub Canopy:
1.00	Vegetative Ground Cover:
Pistia, Pennisetum purpureum, Phragmites, Lemna, open water	
1.00	Upland/Wetland Buffer:
1.50	Field Indicators of Wetland Hydrology:
Narrower ditch than canal to the north, only 10-12 ft. wide and 1 ft. deep; likely to dry seasonally	
2.50 = $\frac{LU+PT}{2}$	Water Quality Inputs and Treatment:
	Land Use: 2.5 Pre-treatment 2.5

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 12 – Canal at mile 8.4 (Canal about 20 ft. wide and 4 ft. deep) **SUMMARY SCORE: 0.65**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
2.00	Fish and Wildlife Utilization:
Forage fishes, common moorhen, alligator, apple snail, dragonfly, other invertebrates	
N/A	Overstory/Shrub Canopy:
2.00	Vegetative Ground Cover:
Open water, < 25% undesirable species, some *Pennisetum purpureum*	
1.50	Upland/Wetland Buffer:
≥ 30 ft., < 300 ft.	
2.00	Field Indicators of Wetland Hydrology:
2.25 = $\frac{LU+PT}{2}$	Water Quality Inputs and Treatment:
	Land Use: 2 Pre-treatment 2.5
Land use score lowered by low density residential area to east.	

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 14 – Ditch by airport at mile 15.1 **SUMMARY SCORE: 0.57**
(Narrower ditch, about 8 ft. wide, about 8 inches deep)
Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
1.00	Fish and Wildlife Utilization:
Moderate density of forage fish, could be used by feeding wading birds.	
N/A	Overstory/Shrub Canopy:
1.50	Vegetative Ground Cover:
Mostly open water, with some *Cyperus, Pistia, Typha, Eleocharis*	
2.50	Upland/Wetland Buffer:
> 30 ft., < 300 ft.	
1.00	Field Indicators of Wetland Hydrology:
Expected to dry down seasonally.	
2.50	Water Quality Inputs and Treatment: $\frac{LU+PT}{2}$

Land Use: 2.5 Pre-treatment 2.5

Land use and pre-treatment scores lowered by higher density residential

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 13 – Ditch at mile 12.9 **SUMMARY SCORE: 0.47**
(Narrower ditch, about 15 ft. wide, about 2 ft. deep)
Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
1.00	Fish and Wildlife Utilization:
Few fish; heavily urbanized area	
N/A	Overstory/Shrub Canopy:
1.00	Vegetative Ground Cover:
Open water, < 25% undesirable species, some *Pennisetum purpureum*	
1.50	Upland/Wetland Buffer:
> 30 ft., < 300 ft.	
1.50	Field Indicators of Wetland Hydrology:
Expected to dry down seasonally.	
2.00	Water Quality Inputs and Treatment: $\frac{LU+PT}{2}$

Land Use: 2 Pre-treatment 2

WETLAND EVALUATION SUMMARY
WETLAND RAPID ASSESSMENT PROCEDURE

Wetland Number: Polygon 15 – Ditch adjacent to sugarcane at mile 19 (Narrower ditch, about 8 ft. wide, about 6 inches deep) **SUMMARY SCORE: 0.32**

Property: Herbert Hoover Dike Major Rehabilitation Project

Date of Site Visit: November 3, 1999

Assessment Team Members: Mark Ziminske and Angie Charles (COE); Tim Towles (FWC); David Ferrell and Robert Pace (USFWS)

Wetland Classification: FLUCCS: NWI: FNAI:

Soil Type:
Land Use:

SCORE	NOTES
0.50	**Fish and Wildlife Utilization:**

Low abundance of forage fish

N/A	**Overstory/Shrub Canopy:**

0.50	**Vegetative Ground Cover:**

Mostly open water, with floating periphyton mats

1.00	**Upland/Wetland Buffer:**

> 30 ft., < 300 ft.

0.50	**Field Indicators of Wetland Hydrology:**

Expected to dry down seasonally.

$= \frac{LU+PT}{2}$

2.25	**Water Quality Inputs and Treatment:**

Land Use: 2.25 Pre-treatment 2.25

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecosystem Office
P.O. Box 2676
Vero Beach, Florida 32961-2676

June 9, 1999

Mr. James C. Duck
Chief, Planning Division
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

Lt. Colonel Michael A. Moore, then Acting Chief, Planning Division, sent a letter on November 30, 1998, requesting the Fish and Wildlife Service's (Service) concurrence with the Corps of Engineers' (Corps) determination that the work proposed under the Herbert Hoover Dike Major Rehabilitation Feasibility Study is not likely to adversely affect federally listed threatened or endangered species. The six species considered in your determination were: the endangered West Indian manatee (*Trichechus manatus*), threatened bald eagle (*Haliaeetus leucocephalus*), endangered snail kite (*Rostrhamus sociabilis plumbeus*), endangered wood stork (*Mycteria americana*), threatened indigo snake (*Drymarchon corais couperi*), and endangered Okeechobee gourd (*Cucurbita okeechobeensis okeechobeensis*).

The Corps' letter agreed to implement recommendations provided in our October 30, 1998, draft Fish and Wildlife Coordination Act Report that would avoid adverse effects on the bald eagle and the indigo snake. We recommend that these protective measures be described in the Corps' Feasibility Study report. Based on your acceptance of these measures, the Service is able to concur with your determination that the proposed project is not likely to adversely affect threatened or endangered species. Although this does not constitute a Biological Opinion described under Section 7 of the Endangered Species Act, it does fulfill the requirements of the Act, and no further action is required. If modifications are made in the project or if additional

information involving potential impacts on listed species becomes available, please notify Mr. Robert Pace at (561) 778-0896, Ext. 11.

Sincerely,

David L. Ferrell
Supervisor
South Florida Restoration Projects

cc: GFC, Vero Beach, Florida (Attention: Mary Ann Poole)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecosystem Office
P.O. Box 2676
Vero Beach, Florida 32961-2676

October 30, 1998

Colonel Joe R. Miller
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attention: Planning Division

Re: Herbert Hoover Dike
Major Rehabilitation Report
(Reach One)

Dear Colonel Miller:

We are pleased to provide the enclosed draft Fish and Wildlife Coordination Act report for the Herbert Hoover Major Rehabilitation Report. This draft report is provided in accordance with the Fish and Wildlife Coordination Act (FWCA) of 1958 (48 Stat. 401, as amended: 16 U.S.C. 661 et seq.) and section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.)

Informal consultation under section 7 of the ESA is continuing. The enclosed report provides recommendations that may allow the Fish and Wildlife Service to concur with a determination by the Corps of Engineers that the project would be "not likely to adversely affect" threatened or endangered species. We recommend that you review these recommended protective measures prior to submitting a determination of effect for our review.

Following concurrence by the Florida Game and Fresh Water Fish Commission, the final report will constitute the report of the Secretary of Interior as required by section 2(b) of the FWCA.

Sincerely,

Robert T. Pace for

David L. Ferrell
Supervisor
South Florida Restoration Projects

cc:

Bradley Hartman, GFC, Tallahassee, Florida
Mary Ann Poole, GFC, Vero Beach, Florida
SFWMD, West Palm Beach Florida

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecosystem Office
P.O. Box 2676
Vero Beach, Florida 32961-2676

October 30, 1998

Dr. Allan L. Egbert
Executive Director
Florida Game and Fresh Water Fish Commission
620 S. Meridian Street
Tallahassee, FL 32304

Attention: Mr. Brian Barnett, Office of Environmental Services

Dear Dr. Egbert:

Enclosed is a draft Fish and Wildlife Coordination Act (FWCA) Report for Herbert Hoover Dike Major Rehabilitation Report (Reach One).

We wish to express appreciation for the assistance of Ms. Mary Ann Poole, Office of Environmental Services, Vero Beach, in the field inspection of this project and for review of an earlier draft.

Please provide us with your comments or concurrence by December 31, 1999. If you have any questions regarding the enclosed report, please call Mr. Robert Pace of my staff at (561) 778-0896, Ext. 11.

Sincerely,

Robert Pace for

David L. Ferrell
Supervisor
South Florida Restoration Projects

cc:
GFC, Vero Beach

NOV 16 1998

FLORIDA GAME AND FRESH WATER FISH COMMISSION

November 12, 1998

OFFICE OF ENVIRONMENTAL SERVICES
BRADLEY J. HARTMAN, DIRECTOR
FARRIS BRYANT BUILDING
620 South Meridian Street
Tallahassee, FL 32399-1600
(850) 488-6661
SUNCOM 278-6661
FAX (850) 922-5679
TDD (850) 488-9542

Mr. Stephen Forsythe
Florida State Supervisor
U.S. Department of the Interior
Fish and Wildlife Service
P.O. Box 2676
Vero Beach, Florida 32960

Re: Herbert Hoover Dike Major Rehabilitation Report (Reach One), Martin and Palm Beach Counties

Dear Mr. Forsythe:

The Office of Environmental Services of the Florida Game and Fresh Water Fish Commission (GFC) has reviewed the draft Fish and Wildlife Service Fish and Wildlife Coordination Act Report (CAR) on the this project, and concurs with your findings and recommendations. We note, however, that the recommendation on page five to coordinate with the GFC if burrowing owls (state listed as a species of special concern that is also protected by the Migratory Bird Treaty Act) is not reiterated in Section VIII ("Recommendations and Summary of Position"). Therefore, we suggest that the final version of the CAR consolidate all recommendations made throughout the report into one comprehensive set of recommendations.

Sincerely,

Bradley J. Hartman, Director
Office of Environmental Services

BJH/MAP
ENV 2-16/2/2/5
HHDFWCAR.LET
cc: Mr. Robert T. Pace, USFWS, Vero Beach

DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT

ON THE

HERBERT HOOVER DIKE
MAJOR REHABILITATION REPORT
(REACH ONE)

Prepared by:

Robert T. Pace
U.S. Fish and Wildlife Service
South Florida Restoration Office
Vero Beach, Florida

October 1998

I. IDENTIFICATION OF PURPOSE, SCOPE, AND AUTHORITY

The levee system around Lake Okeechobee began as a project of the state of Florida with the construction of 47 miles of low levees in 1927. The River and Harbor Act of July 3, 1930, approved reconstruction and improvement of the levee after the original low levee failed during the 1928 hurricane. Reconstruction of the levees started in 1931 along the south shore of the lake. By 1937, 69.2 miles of continuous levee had been completed around the west, south, and east shores of the lake.

The Flood Control Act of 1948 (P.L. 858, 80th Congress, 2d Session) authorized the first phases of the comprehensive plan to provide flood protection and other water control benefits in central and south Florida. In 1961, the levee system was dedicated and renamed the Herbert Hoover Dike (HHD). The elevation of the HHD was raised and structural improvements were made between 1962 and 1967.

In 1993, the COE prepared a special report entitled, "Herbert Hoover Dike, Seepage and Stability Analysis". The present feasibility study, which will result in a Major Rehabilitation Report (MRER), stems from concerns about the stability of the HHD. The emphasis of the current phase of study is Reach One of the HHD (see *Location of the Study Area*, below). The major objectives of the MRER are to: 1) determine the overall engineering condition of the HHD at Reach One; 2) determine the current reliability of all major project features; 3) identify project features which are not reliable; 4) develop methods to remedy or manage the problems; 5) identify environmental concerns; and 6) identify a recommended plan and cost estimate for the plan.

II. DESCRIPTION OF STUDY AREA

A. Location of the Study Area

The HHD system is approximately 143 miles (230 km) long, and is divided into 8 segments or "Reaches" for planning purposes. The southeastern segment, Reach One, is the focus of the present study. Reach One is an approximately 22.4 miles (36 km) long segment of the HHD located along the southeast portion of the Lake. This segment extends from the St. Lucie Canal at Port Mayaca, south to the Hillsboro Canal at Belle Glade (Figure 1).

B. Description of the Study Area

The habitat types landward of Reach One have been greatly altered during the last century. Historically, the natural vegetation was a mix of freshwater marshes, hardwood swamps, cypress swamps, and pine flatwoods. Although some of these natural areas still exist, the introduction of controlled drainage for agriculture and land development has resulted in a significantly different set of cover types. Land uses along the landward edge of the levee are largely residential, commercial, or agricultural. Sugarcane fields are located in many cases directly along the

landward toe of the HHD (Figure 2) or are located a short distance away. Other agricultural uses along the HHD include tree nurseries, small banana plantations, and other fruit groves, especially mangoes. Residential lots are present along portions of the toe of the HHD, particularly in the cities of Canal Point and Pahokee. The Florida East Coast Railway borders a portion of the HHD, as does the Palm Beach County Glades Airport.

The remaining wildlife habitats consist primarily of wetlands found along the toe ditch and adjacent low lying areas and are usually a result of impoundment rather than natural hydrology. The majority of these are small, isolated freshwater wetlands which are located in the northern portion of Reach One within the strip of land between the HHD and the transportation corridor (Highway 98/441 and the Florida East Coast Railroad). The toe ditch itself provides some usable wetland habitat along the entire length of Reach One. Typical vegetation in these wetlands includes Carolina willow (*Salix caroliniana*), melaleuca (*Melaleuca quinquenervia*), Brazilian pepper (*Schinus terebinthifolius*), Australian pine (*Casuarina* sp.), water hyacinth (*Eichhornia crassipes*), cattail (*Typha domingensis*), water lettuce (*Pistia stratiotes*), and duckweed (*Lemna* sp.). Although wetlands present on the landward side of Reach One may not be considered high quality ecosystems, they do host a variety of small fishes and invertebrates and provide usable foraging habitat for wading birds.

Waterward of Reach One, there are few wetland areas immediately adjacent to the HHD. Due to dredging activities for the rim canal which parallels the dike, the littoral zone is narrower than would occur naturally. The water depth increases rapidly here, providing less than optimal habitat. Beyond the rim canal, however, large freshwater marshes are still found waterward of Reach One. These are primarily around Kreamer and Torry Islands which are located near the southern extent of Reach One, and provide several thousand acres of valuable habitat.

III. FISH AND WILDLIFE RESOURCES OF CONCERN IN PLANNING

A. Introduction

The fish and wildlife resources of Lake Okeechobee are of exceptional value, including threatened and endangered species, abundant waterfowl, an exceptionally productive recreational fishery, and commercial fisheries. The commercial fisheries generate $6.3 million annually, and consist of a trotline fishery for catfish (*Ameriurus* spp. and *Ictalurus* spp.), and a haul seine fishery for catfish and bream (*Lepomis* spp.) (Bell 1987). The recreational fishery generates $22.1 million annually and has an estimated asset value of $100 million (Bell 1987). Waterfowl and alligator hunting are also important recreational and commercial activities in the lake.

The FWS has great interest in the protection and enhancement of fish and wildlife resources within Lake Okeechobee. However, the preferred design of this project should have negligible effect on habitat conditions on the lakeshore side of the HHD. Our description of affected resources and fish and wildlife concerns in this FWCA Report concentrates on those resources

found either on the HHD itself or the areas to be affected by construction of the preferred alternative immediately to the landward side of the HHD.

B. Fish and Wildlife Resources

Wading birds are commonly observed on both the landward and waterward sides of the HHD, indicating a viable population of small fishes and invertebrates along either toe of the dike. Wading birds observed include great blue heron (*Ardea herodias*), great egret (*Casmerodius albus)*, little blue heron (*Egretta caerulea*), tricolored heron (*E. tricolor*), snowy egret (*E. thula*), cattle egret (*Bubulcus ibis*), white ibis (*Eudocimus albus*), and wood stork (*Mycteria americana*). Other birds observed along the waterward side of the HHD included the snail kite (*Rostrhamus sociabilis plumbeus*), black skimmer (*Rynchops niger*), brown pelican (*Pelecanus occidentalis*), double-crested cormorant (*Phalacrocorax auritus*), and anhinga (*Anhinga anhinga*).

Within the waters of the lake, important species contributing to the sport and commercial fisheries include largemouth bass (*Micropterus salmoides*), catfish (Ictaluridae) black crappie (*Pomoxis nigromaculatus*), bluegill (*Lepomis macrochirus*), redeared sunfish (*Lepomis microlophus*), and Florida gar (*Lepisosteus platyrhincus*). Although some of these species larger species may be present in the borrow pit on the landward side of the HHD (Figures 3 and 4), the shallow wetlands along most of the length of the landward side of the levee are most likely inhabited by smaller marsh inhabiting fishes, such as the abundant mosquitofish (*Gambusia holbrooki*), least killifish (*Heterandria formosa*), and sailfin mollie (*Poecilia latipinna*).

Several species of reptiles and amphibians are likely to inhabit the shallow wetlands and the deeper borrow pit along the landward side of the HHD, where project impact will occur. The FWS has not surveyed these areas for reptiles and amphibians, but we anticipate the presence of several species of turtles and frogs, and the American alligator (*Alligator mississippiensis*).

C. Threatened and Endangered Species

Informal consultation under section 7 of the Endangered Species Act is in progress for this project. The FWS recommends that the COE consider the information and recommendations provided below before providing a determination of effect on listed species. The FWS would likely be able to concur with a determination by the COE that the project is not likely to affect listed species if the COE agrees to the protective measures recommended in this report.

1. Federally Listed Species

The following federally listed threatened and endangered species have been considered in this informal consultation:

Trichechus manatus	West Indian manatee	Endangered
Haliaeetus leucocephalus	Bald eagle	Threatened

Rostrhamus sociabilis plumbeus	Snail kite	Endangered
Mycteria americana	Wood stork	Endangered
Drymarchon corais couperi	Eastern indigo snake	Threatened
Cucurbita okeechobeensis	Okeechobee gourd	Endangered

As noted above, the endangered wood stork and the endangered snail kite are known to occasionally feed in the wetlands to be affected along the landward side of the HHD. However, the principal habitats in the area for both of these species are located within the littoral zone of Lake Okeechobee, and the project is not expected to affect these habitats. Neither species is known to nest close to Reach One. Provided that the compensatory wetland mitigation recommended below is carried out by the COE, the FWS could concur with a determination by the COE that the project is not likely to adversely affect either of these two species.

The West Indian manatee is known to inhabit Lake Okeechobee. Since the manatee only inhabits the lake itself, and the construction associated with the planned alternatives will occur along the landward base and crown area of the HHD, no protective measures are required.

The bald eagle may be of greatest concern with regard to the proposed alternatives. Two nests have been reported and entered into the Florida Natural Areas Inventory (FNAI) database. One of the nests is near Belle Glade, and is approximately 5 miles from the southern-most edge of Reach One. The other nest is near the City of Pahokee, in proximity to Reach One of the HHD. This nest has been classified as active from 1990 through 1995, although no chicks have been produced from it for the same time period. A bald eagle nest must be inactive for five years to be considered abandoned (FWS 1987).

Prior to detailed design of the proposed project, and again before issuance of any contracts for construction, the COE should have a qualified biologist survey up to 1 km from the construction site to determine the exact location of any bald eagle nests and research their history of activity within the preceding 5 years (FWS 1987). The previously reported locations for the two nests mentioned above would be the starting point for these surveys, but it is important to recognize that an established nesting territory for a pair of bald eagles may contain several alternate nest sites. It is also possible that in the years before completion of detailed design and initiation of construction, an entirely new breeding pair of eagles may establish a nest site within the zone of disturbance of the proposed project. Therefore, the surveys should not be limited to the known existing nest sites. Specific recommendations to protect any bald eagle nests should be determined on a case-by-case basis. A 750-foot primary zone and, as a minimum, a 750-foot secondary zone should be established around any active nests. Construction should not occur within 1,500 feet of an active nest during the nesting season, which normally lasts from October 1 to May 15. A specific bald eagle management plan should be prepared and reviewed by the FWS 6 months to one year prior to mobilization of construction.

The threatened Eastern indigo snake is known to occur in the vicinity of the HHD, as evidenced by FNAI records. Standard protective measures for the Eastern indigo snake include display of

educational posters at construction staging areas and instruction of crew members in protection measures. Construction crews should be informed of the protected status of the species and should be instructed to allow any Eastern indigo snakes to escape unharmed if they are flushed by construction activity.

Although the endangered Okeechobee gourd is known to occur on Torry Island, we do not anticipate any effect on the species if the selected alternative restricts construction to the crown and landward side of the HHD.

2. State Listed Species

In addition to the species mentioned above, a number of other species listed by the State of Florida as threatened, endangered, or of special concern are likely to be present in the project area. These include the following:

Ajaia ajaja	Roseate spoonbill	SSC
Aramus guarauna	Limpkin	SSC
Egretta caerulea	Little blue heron	SSC
Egretta rufescens	Reddish egret	SSC
Egretta thula	Snowy egret	SSC
Egretta tricolor	Tricolored (=Louisiana) heron	SSC
Eudocimus albus	White ibis	SSC
Grus canadensis pratensis	Florida sandhill crane	T
Pelecanus occidentalis	Brown pelican	SSC
Speotyto cunicularia	Burrowing owl	SSC
Alligator mississippiensis	American alligator	SSC

Although the COE should consult with the GFC about any specific recommendations with regard to these species, the FWS is aware of the GFC's particular concern about protecting burrowing owls, which may be present along Reach One of the HHD. Burrowing owl nests were documented as occurring along other portions of the HHD in the late 1980s (M. Poole, GFC, personal communication 1998), and we recommend that surveys be conducted to determine if burrowing owl nests are found in Reach One. If nests are found along Reach One, modifications of timing or location of activity may be needed to avoid taking of nests. Burrowing owl nests are generally inactive between July 10 and February 15. Flagging placed at least 10 feet around burrows, combined with education of construction workers to avoid those areas, might avoid direct destruction of burrows, although disturbance around the burrows may be unavoidable. Please contact the Nongame Wildlife Section Supervisor of the GFC in Tallahassee for specific protection measures to protect the burrowing owl.

IV. SUMMARY OF PLAN SELECTION PROCESS, AND IDENTIFICATION OF EVALUATED ALTERNATIVES

The COE has become increasingly concerned about the seepage and stability of the HHD since the 1994-1995 high water event. Boils and pipings were observed in 1995 at several sites along Reach One. The 1997-1998 El Niño also raised water stages in Lake Okeechobee. The COE has described several alternatives to address this problem:

No Action Alternative This would allow the continued potential for unsatisfactory performance of the HHD along Reach One.

Alternative 1 This alternative involves construction of a stability berm at the landside toe of the levee and installing culverts with automatic/manual gates and pumps to control the water level in the ditches. During high lake stage events, water levels landward of the dike would be raised in order to reduce differential head, and increase dike stability.

Alternative 2 This alternative involves construction of an upstream impervious cutoff wall and a landside stability berm at the toe of the levee which would impede groundwater flow and control under-seepage.

Alternative 3 (The COE's Preferred Alternative) This alternative entails installation of a seepage berm with relief trench along the lower portion of the landward toe of the embankment.

V. FISH AND WILDLIFE RESOURCE CONCERNS AND PLANNING OBJECTIVES

The FWS' principal concern has been to avoid any disposal of fill material or armoring of shoreline along the littoral zone of Lake Okeechobee, which would have significant adverse impact on fish and wildlife resources. Filling or excavation of wetlands along the landward side of the HHD is of lesser concern, but is a significant enough loss of habitat to require compensatory mitigation. A secondary concern would be the impact of excavation or earth movement along the waterward slope of the HHD; although this would not directly eliminate littoral zone habitat, the FWS would be concerned about potential erosion of soil into the lake and/or increased input of dissolved nutrients. A third level of concern involves the indirect impact of disturbance on fish and wildlife in the project area; these concerns are discussed above, particularly with respect to the bald eagle, the Eastern indigo snake, and the burrowing owl.

VI. PROJECT IMPACT EVALUATION

A. Evaluation Framework

No formal evaluation methodology was employed for this project. The project impacts can be adequately assessed by studying the alternative project designs, combined with a general familiarity of the fish and wildlife resources of the area, and observations made during a site visit with a GFC biologist on September 22, 1998. Typically the FWS assesses the impacts attributable to this water development project by comparing future without-project conditions to future with-project conditions.

B. Fish and Wildlife Resources Without the Project

The FWS anticipates that the proposed work in Reach One could be completed within 10 years, so we have selected the year 2009 as the planning horizon for this project. The future without project conditions are expected to be similar to the existing conditions. The COE and the SFWMD are considering changes to the Lake Okeechobee regulation schedule. Although small changes in the regulation schedule for Lake Okeechobee can provide broad benefits to fish and wildlife on a large scale across the extent of the lake, no major habitat shifts are expected close to the Lake Okeechobee rim canal within Reach One of the HHD. Our field inspection revealed that limited control of melaleuca has occurred along the waterward side of some portions of the HHD, but extensive stands of melaleuca are still present, particularly along the Lake Okeechobee rim canal near Torry Island. Although some additional melaleuca control is likely to occur in Lake Okeechobee without the proposed project, current efforts are concentrated in the extensive interior marshes of the lake, with no immediate plans to address the densest stands along the rim canal. Except for some increase in residential and commercial development in the cities of Pahokee and Belle Glade, no major changes in land use are anticipated along the landward side of the HHD. The area is likely to remain largely rural, with extensive areas of sugarcane and scattered plots of fruit trees and vegetables along major portions of Reach One of the HHD..

C. Project Impacts

Through early coordination between the FWS and the COE, initial concerns regarding the direct impact of the alternatives on the littoral zone of Lake Okeechobee have been eliminated. None of the considered alternatives would directly disturb the waterward toe of the HHD. The impacts of the considered alternatives are briefly summarized below.

No Action Alternative The No Action Alternative would cause no additional direct or indirect impacts to fish and wildlife in the project area, beyond the existing maintenance activities for the HHD. However, the current instability problems would most likely increase and would be unsatisfactory to the COE. Should these problems result in partial failure of the HHD, the implications to fish and wildlife landward of the HHD would be limited to the areas of the breach and immediately adjacent habitats, and the effects would

likely be of short duration. The expected drop in water levels in Lake Okeechobee due to a partial failure of the HHD would likely be gradual and not so extreme as to cause major environmental damage to the lake's littoral zone.

Alternative 1 Excavation necessary for installation of the gated culvert system and stability berm would cause a temporary loss of wetland habitat located along the landward toe of the HHD. The raised water levels during high lake water events however, may result in larger wetland areas, increasing the potential area of fish and wildlife habitat. As water levels recede in the ditch at the landward toe of the HHD, wading birds might be attracted to feed following a high stage event in the lake. The overall fish and wildlife habitat value of these ditches would depend on to what extent dense native vegetation (such as cattail) and/or exotic vegetation (such as Brazilian pepper) would be allowed to grow in the ditches. Overly dense growths of vegetation would likely reduce the diversity of wildlife finding preferred habitat in the ditch. Because the habitat value of the existing wetlands along the toe ditch of the HHD is reduced by the dense growth of exotic species, the habitat value of the replacement ditch likely would compensate for the temporary loss of the existing habitat, provide that a program to control exotic species is instituted for the replacement ditch.

Alternative 2 Excavation and filling necessary for installation of the stability berm (up to 30 feet wide) will cause some loss of wetland habitat located along the landward toe of the HHD, which would require compensatory mitigation. This alternative is not preferred by the COE primarily due to the cost of constructing the cutoff wall. The FWS does not prefer this alternative because installation of the cutoff wall would require major excavation and deposit of material along the waterward slope of the HHD, increasing the threat of erosion of material into Lake Okeechobee. Even if erosion barriers were placed along the construction site, some nutrient-laden runoff would likely reach the lake. All of the other considered alternatives would not require disturbance of the well stabilized grassy slope on the waterward slope of the HHD.

Alternative 3 (The COE's Preferred Alternative) Converting existing toe ditches to a controlled system of covered culverts as part of a seepage berm would eliminate existing wetlands within an estimated 50-foot wide right of way of the current toe of the HHD. Compensatory mitigation should be required for this loss.

VII. EVALUATION AND COMPARISON OF THE SELECTED PLAN AND EVALUATED ALTERNATIVES

The following matrix provides a comparison of the environmental protection measures recommended by the FWS for each of the alternatives (other than the No Action Alternative):

	Compensatory Wetland Mitigation	Exotic Vegetation Control	Erosion Control Along Lakeshore Slope	Water Quality Monitoring in Lake	Measures to Avoid Disturbance of Wildlife
Alternative 1	None	In replacement toe ditch	Yes	Yes	Yes, greater area than Alts. 2 & 3
Alternative 2	Yes	In compensatory wetlands	No	No	Yes
Alternative 3	Yes, probably greater than Alt. 2	In compensatory wetlands	No	No	Yes

The FWS recommends against selection of Alternative 1 due to the greater area of potential construction disturbance for wildlife such as the burrowing owl and the Eastern indigo snake. We also recommend against Alternative 1 due to the potential for sediment erosion and dissolved nutrient impacts on Lake Okeechobee.

Due to its greater width of excavation and filling along the landward toe of the HHD, Alternative 3 would likely require a greater area of compensatory mitigation than Alternative 2, but either of these alternatives would be acceptable to the FWS, provided the compensatory mitigation recommended below is carried out.

VIII. RECOMMENDATIONS AND SUMMARY OF POSITION

The FWS finds either Alternative 2 or Alternative 3 to be acceptable, provided that:

1) compensatory wetland mitigation will be provided for unavoidable losses of wetlands;

2) control of exotic vegetation will be carried out in perpetuity in the compensatory wetlands;

3) construction will be scheduled to avoid activity within 1500 feet of any active bald eagle nest during the nesting season;

4) standard protective measures will be carried out to avoid wounding or killing Eastern indigo snakes;

and

5) if burrowing owls are found to be present in the project area, impacts will be minimized by altering construction schedules to avoid the nesting season and/or burrows will be cordoned off to avoid their direct destruction.

The FWS asks the COE to consider these recommendations prior to providing a determination as to whether the proposed project is likely to adversely affect any threatened or endangered species. As noted in a previous section of this report, the FWS would most likely concur with a determination by the COE of "not likely to adversely affect" if the above recommendations become part of the project plans.

The FWS recommends that compensatory mitigation be located, if possible, in the existing borrow pit along the HHD (Figures 4 and 5). This strategy may provide both engineering and ecological advantages. The borrow pit appears to be a vulnerable point for seepage; in addition to the filling required to install the collection culverts in Alternative 3, shallowing of the borrow pit beyond the normal 50-foot right of way would likely provide additional stability and resistance to seepage. The ecological benefits would be realized not only in consolidating the compensatory mitigation into a single larger area where exotics can be controlled, but also in the constructed wetland's proximity to the remaining open water. Figure 6 provides a schematic cross section of the proposed mitigation.

The FWS recommends that as the project enters detailed design, the habitat values of the existing wetlands to be eliminated by the project be assessed using the Wetlands Rapid Assessment Procedure (WRAP). If the COE can ensure that exotic vegetation will be controlled in the compensatory wetlands, the WRAP would most likely conclude that a smaller area of compensatory wetland will be required to offset the total area of wetlands to be eliminated by the project. The appropriate mitigation ratio must be determined prior to detailed planning of the compensatory mitigation.

IX. LITERATURE CITED

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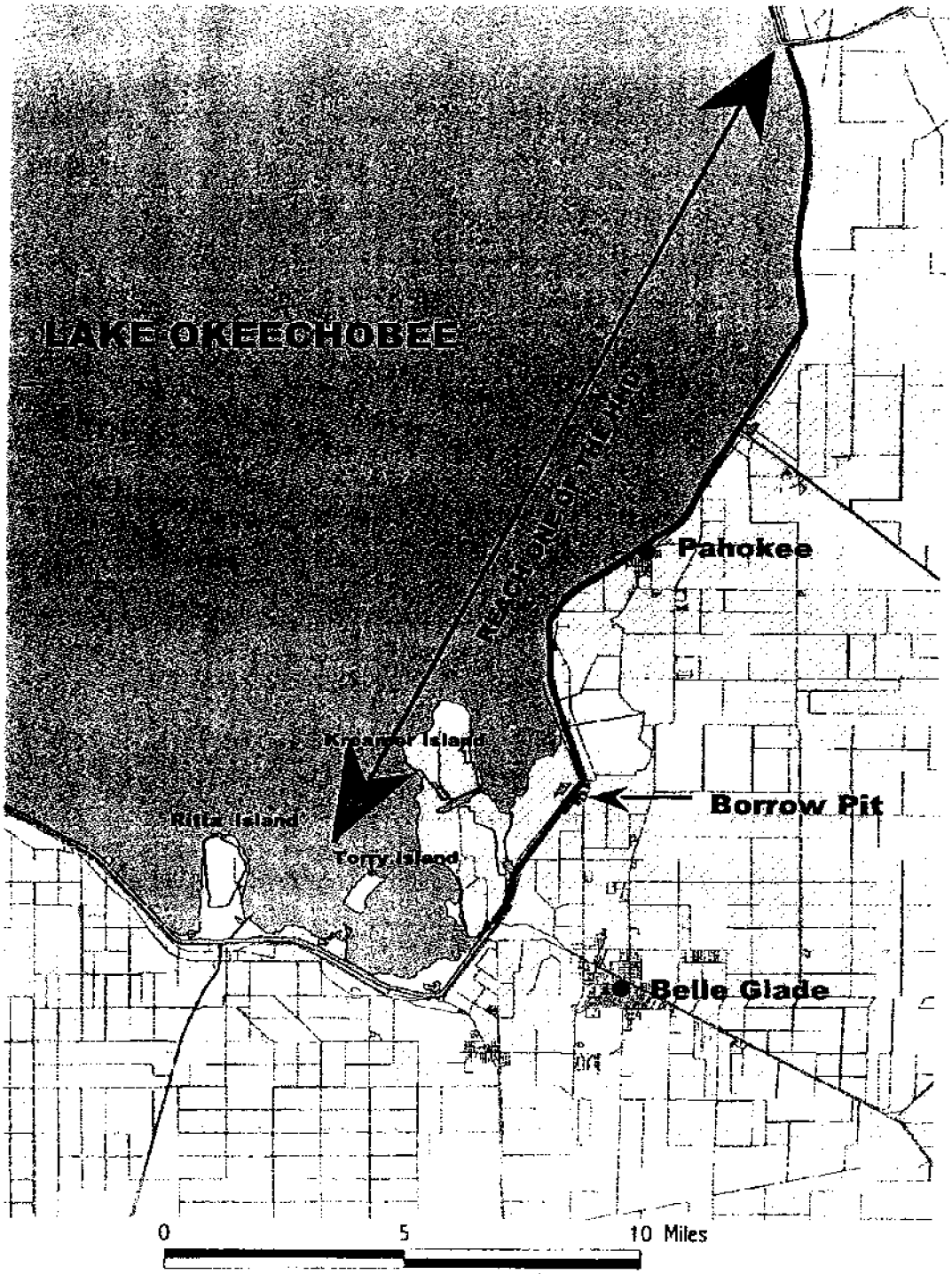

Figure 1. General Location of the Study Area

Figure 2. Typical view from crest of the HHD. Levee roadbed is at right foreground, and sugarcane fields are in left background.

Figure 3. View from crest of the HHD where narrow section of borrow pit is immediately adjacent to toe of the HHD.

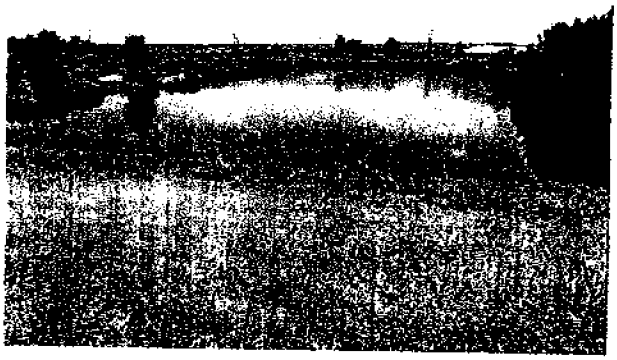

Figure 4. A broader portion of the borrow pit is immediately adjacent to the toe of the HHD in this segment.

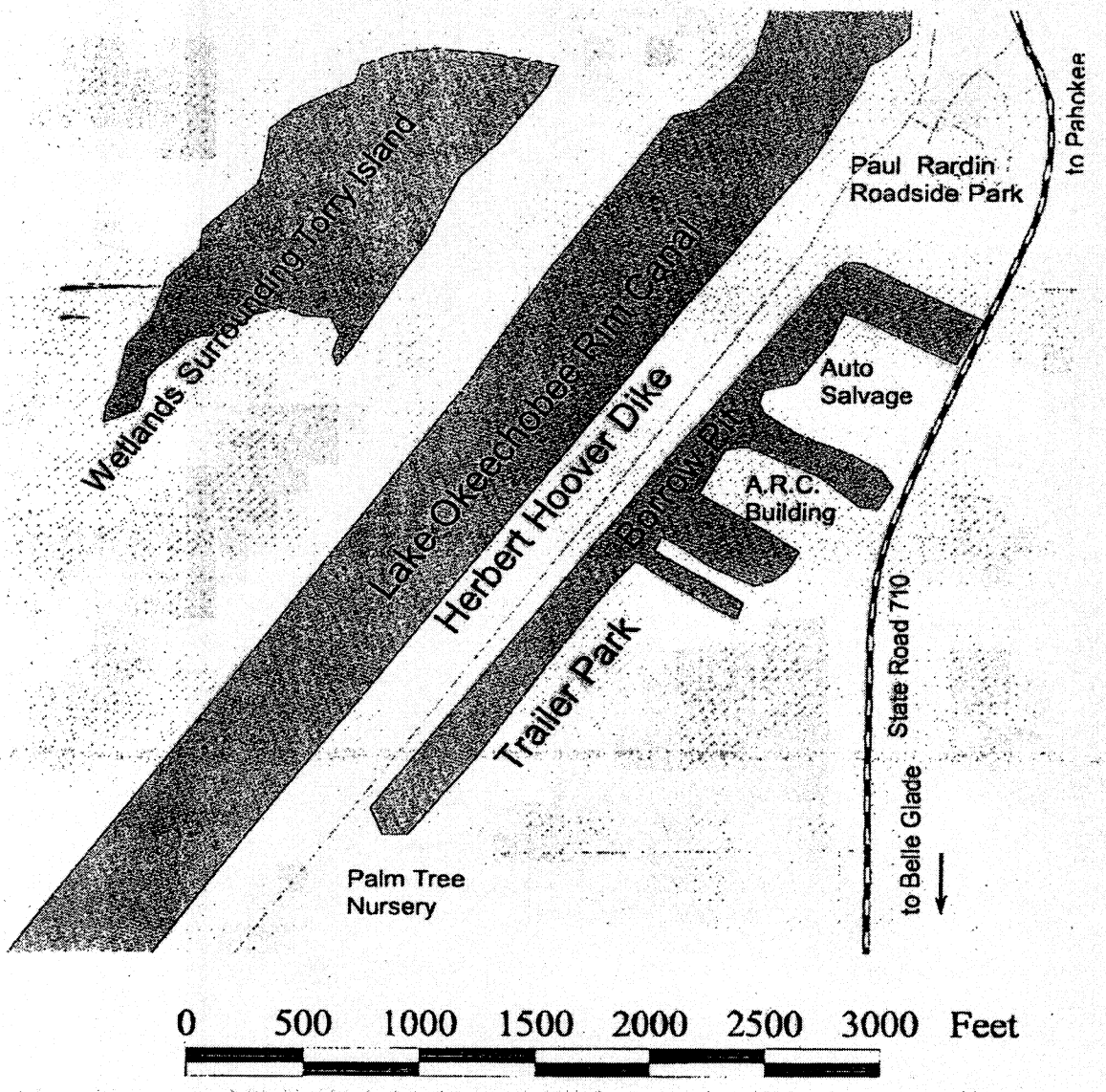

Figure 5. Location of Borrow Pit Along the Herbert Hoover Dike

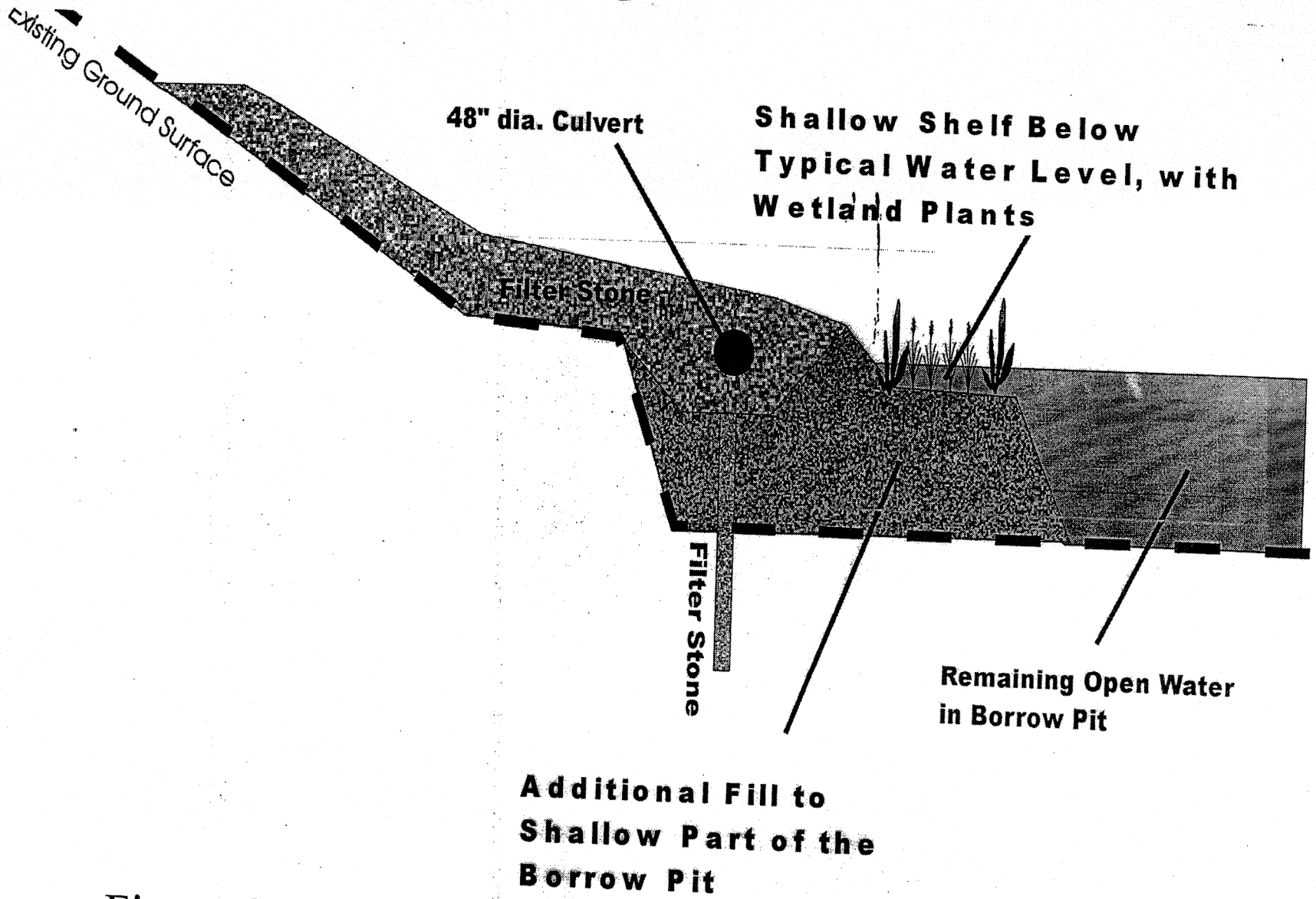

Figure 6. Schematic drawing of wetland mitigation area under the COE's preferrred allternative.